

Railway Age

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Railway Taxes and Dividends

FOR three successive years now, and in four years out of the last five, the amount of taxes paid by the railways to the state and federal governments has exceeded the amount which they have distributed to their stockholders in dividends. The taxes paid in 1924 by the Class I railroads, \$340,342,067, not only exceeded those of any previous year but represented an increase of 187 per cent as compared with 1913, while the dividends paid amounted to less than in 1913. As compared with 1923 there was an increase of \$8,426,608, or 2.5 per cent. In 1913 the cash dividends paid by the railroads aggregated \$322,300,406 and the taxes paid in that year only \$118,386,859. In 1920 the dividends amounted to \$271,731,669 and the taxes to \$272,061,453, or slightly in excess of the dividend payments. In 1921 dividends again exceeded taxes but since that time taxes have increased rapidly while dividends have been less in two years and slightly higher in 1924 than they were in 1921. In 1922 the dividend payments amounted to \$271,573,751 and the taxes to \$301,034,923. In 1923 the dividends amounted to \$296,073,048 and the taxes to \$331,915,459, and in 1924 the dividends amounted to \$310,221,064 and the taxes to \$340,342,067. According to a statement by the Bureau of Railway Economics the average daily tax bill of the railways in 1924 amounted to \$929,896 and out of each hundred dollars of operating revenues received by the roads \$5.80 went for taxes, as compared with \$4.40 in 1923. Of the \$330,342,067 paid in taxes in 1924, \$73,367,510, or about 20 per cent, went to the federal government, a reduction of nearly 5 per cent as compared with the year before, while \$265,945,732, or nearly 80 per cent, went to the various state governments. In 35 states there was an increase of more than 7 per cent, while in only 13 states was there any decrease.

Canadian Senate for C. P. R.-C. N. R. Merger

A COMMITTEE of the Canadian Senate has presented a report recommending the consolidation for operating purposes of the Canadian National and the Canadian Pacific. The plan which it outlines is given in detail on another page of this issue. It would place the combined railways in charge of a board of 15 directors, five to be chosen by the Canadian Pacific, five by the Canadian government and the remainder by the ten already named. The Canadian Pacific would be guaranteed a minimum dividend on its stock. The capitalization of the Canadian National would be scaled down to conform to its earning power. If a surplus remained after the dividend on the C. P. R. stock had been paid, a similar dividend would be paid on C. N. R. capitalization as reduced, and earnings beyond these would be shared by the C. P. R. and C. N. R. according to valuation. It is doubtful whether there is any likelihood of an early solution of the Canadian railway situation along the lines suggested by this

report. In the first place, the report was made public just as Parliament adjourned not to meet again until next year. Then the meetings of the committee were held behind closed doors and no public record exists of the testimony on which the committee reached its conclusions. It is scarcely to be expected that the government would advocate such a far-reaching plan unless it were supported by many persons prominent in industry and politics who would not object to being quoted as to their views. Again, it is somewhat doubtful whether the lower house of Parliament would take kindly to such an important recommendation emanating from the upper house. This latter is not an elective body; its members hold office for life, and of late there has been considerable agitation in favor of reducing its legislative powers. However, the Senate does represent a considerable body of powerful public opinion whose position on any public problem must be reckoned with. This report, then, may prove to be the opening gun of an interesting and important battle—but one which in the nature of things cannot be decided for some time to come.

Take Them, Cheaply and in Comfort, Where They Want to Go

ADVERTISING forms an important part of the expense in connection with operating excursion services, where rates are far under the regular charges. This being the case, it is an uphill business to run excursions to places which large numbers of the public are not already eager to visit. The expense of "selling" the people on making the trip at a particular time and on a particular train is great enough without the added task of "selling" them on the scenic beauties or other advantages of the points to which the special services are to be run. A week or two ago a week-end excursion was operated from New York to Montreal at a fare for the round-trip of \$10. The service was not extensively advertised—yet, according to unofficial figures, about 2,000 persons availed themselves of it. If the excursion had been operated to some less well known or less interesting place probably not one-fourth as many persons would have used it. The steamship companies have proved the efficacy of offering the public cheap and comfortable passage to points which they already desire to visit. As a matter of fact, in point of comfort they have, probably, gone farther than the railroads. Most of the excursion trips which the railroads operate are cheap enough, but, as for comfort, excursionists are not as a general rule allowed to purchase Pullman space and where night travel is involved, as it is in many cases, comfort is largely lacking. This restriction doubtless acts to prevent persons who would otherwise travel at the regular rates from utilizing the lower rates. Yet, at the same time, it undoubtedly causes people to stay at home rather than undergo the discomforts of coach travel at night. The third-class on steamships has always been cheap. Yet it was not until it had been made comfortable as well that tourists were

attracted to it. Perhaps by making the third-class comfortable the companies have lost a little by some persons using it who would otherwise have traveled by a higher class. However, there can be no question but that many persons are now going to Europe who would have stayed at home rather than undergo the discomforts of the old-time steerage. A wide-spread desire to go abroad already existed, as did cheap accommodations. It was only when comfort was added that the trilogy was complete and the tourist stream really mounted high. Now the steamship companies are putting dollars into their coffers which would otherwise have been spent for other things, and they are doing it on a grand scale. Could not the railroads do the same thing by applying similar methods?

The Changing World

THE formal inspection of the new Chicago Union Station by officers of the owning and using roads and of the City of Chicago during the third week in July will bring to completion officially another noteworthy passenger terminal. This project, which is described at length in following pages, introduces a number of innovations in terminal design which are indicative of the constant improvement in railway facilities. This trend is shown in a striking manner by a comparison of the new facilities with those which they replace.

The old station, which was placed in service early in 1881, was characterized in the *Railway Age* of April 7, 1881, as being "costly and elegant" and with "a great stretch of tracks." Yet all of these facilities were contained within an area 134 ft. wide and four blocks long with considerable room to spare for other facilities. The station headhouse itself was housed in a building 280 ft. long by 70 ft. wide. A double-track throat at each end was ample. No signaling or interlocking facilities were required or thought of. Baggage was trucked by hand across the tracks to and from trains. No special facilities were provided for mail.

In contrast the new station, which will serve the same roads that occupied it in 1881, includes a headhouse occupying an entire block, a passenger concourse occupying another block and largely increased areas devoted to tracks both north and south. Suburban traffic, which was practically negligible when the old station was built, now exceeds by several times in number of passengers the total traffic passing through the station 40 years ago. Ten tracks are provided in the throats of the new layout where four were ample for the old. The old tracks were carried on stone ballast supported on the clay subsoil, while the tracks in the new layout are carried on a concrete mat for more than a mile and a half. Traffic over these tracks is governed by interlocking and light signals of the most modern types, involving an expenditure of more than a million dollars. These are some of the developments reflected by a comparison of the best of 40 years ago with that of today.

What the record of the new station will be the future alone can tell. There is no reason to believe, however, that history will not repeat itself and that this station will not become inadequate and obsolete in time as traffic continues to increase and the demands of the traveling public for more and better service continue. The Chicago & North Western station which was completed in Chicago in 1881 gave way to a new terminal 14 years ago. The owners of the Chicago Union Station recognized the need for a new terminal at least 15 years ago. The history of these terminals adds further evidence to the fact that many railway facilities become obsolete in a third of a century.

Railway Passenger Travel

II

THE striking unanimity of opinion among the railroad executives with reference to the loss of their short haul passenger business to automobile and motor bus is nowhere more apparent than in the annual reports to their stockholders. There follow excerpts from the annual reports for the year ended December 31, 1924, of various railroads in widely separated parts of the country.

Boston & Maine.—The decline in general business, coupled with increased motor competition, resulted in a falling off in total passenger revenue. . . . The decrease in interline ticket sales was very much less than the falling off in the sales of local tickets, indicating the greater effect of automobile competition on the short haul traffic.

Chicago & North Western.—The gross revenues from passenger traffic were 6 per cent less than the revenues from the same class of traffic in 1923. The increased use of the motor vehicle has made serious inroads upon short haul passenger traffic. It is interesting to note that since 1916 the number of intrastate passengers has decreased 50 per cent, and that during the same period the number of registered motor vehicles in the nine states in which your company operates has increased by 158 per cent. The management has made every effort to develop the long haul passenger business, with the result that the decrease in number of passengers carried has been offset to some extent by an increase in the average distance traveled by each passenger. Notwithstanding the efforts to increase long haul passenger business, it remains true that the motor vehicle has made serious inroads upon gross passenger revenues, and consequently upon the net from this class of business. The figures given above are exclusive of commutation passengers.

Chicago, Burlington & Quincy.—Owing to the extensive development taking place in our suburban territory, there was a very substantial increase in suburban traffic. Our long haul traffic was not as heavy as during the preceding year, and the short haul business is steadily decreasing due to the continual increase in the use of the automobile.

Colorado & Southern.—The decrease in passenger revenues is due to a general falling off in short haul passenger business since the statistical records show a decrease in passengers carried, but a considerable increase in the average distance each revenue passenger was carried.

Delaware, Lackawanna & Western.—To a far greater extent, however, has the company's passenger traffic been reduced by the increased use of automobiles for travel to resorts or elsewhere, for health, pleasure or business, by those who formerly traveled by train. Furthermore, there are numerous motor bus lines making daily regular trips on highways located, in many cases, parallel to the company's railway for many miles and charging somewhat lower fares than the company's rates, with the result that the short distance travel it formerly enjoyed in those localities has almost all been taken from it. It will be seen, when the annual reports of the railways for the year 1924 have been compiled and distributed, that this loss of traffic has been countrywide and presents serious problems which it will be difficult, if not impossible, to solve, the effect being chiefly a reduction in their net earnings, they finding it impossible to reduce their passenger train mileage to an extent commensurate with their passenger revenue losses. This competition is of a permanent character, and will doubtless increase with the growth in the production and sale of motor vehicles of every kind, as to which there now seem to be no bounds.

Hocking Valley.—Reference was made in last year's report to the decrease in the number of local passengers carried and in the revenue therefrom due to the establishment of motor bus lines and increased use of private motor cars. In 1924, there was a further decrease of 24 per cent in the number of local passengers carried and 22.1 per cent in the revenue therefrom due to the same causes. There was a decrease of 12.4 per cent in the revenue from through passengers.

Illinois Central System.—The number of passengers carried one mile was 972,067,080, a decrease of 49,001,555, or 4.80 per cent, compared with the previous year. The decrease in passenger reve-

nue was due to a decline in general business and motor bus competition in short haul traffic.

Minneapolis, St. Paul & Sault Ste. Marie.—Passenger revenue was \$6,575,906, a decrease of \$1,090,852, or 14.2 per cent, compared with previous year. The larger part of this was in local passenger revenue, directly attributable to bus service and the use of privately-owned automobiles. To offset this loss, passenger service was reduced wherever possible.

Missouri-Kansas-Texas.—While the decrease in passenger revenues as compared with the preceding year has been due primarily to the diversion of local traffic to automobile and bus service, there has been no decrease in through travel.

Missouri Pacific.—The decrease in passenger revenue amounted to \$1,445,194, or 7.62 per cent. The loss in passenger revenue is all attributable to the decrease in local travel by reason of the good roads and greater use of automobiles and buses by the traveling public.

New York, New Haven & Hartford.—Competition from motor vehicles transporting freight and passengers for hire continues to be a factor of considerable importance in its effect upon the revenues of your company. There appears to be a growing realization that the unregulated operation of motor vehicles transporting freight and passengers for hire constitutes unfair competition with the railroads.

Union Pacific.—Revenue passengers carried decreased 15.9 per cent due to decrease in number of conventions held in the West, which lessened travel to Pacific Coast points; to a decline in travel occasioned by the smaller crops generally in the territory served by our lines; and to further diversion of local short-haul business to motor vehicles.

Wabash.—The decrease in passenger revenue of \$466,130 was largely due to loss in local passenger earnings as result of the extension of motor bus and interurban service and more common use of private automobiles.

This weight of opinion is such that one would be brave indeed who would question the adverse effect of the automobile on the amount of railway passenger travel and of short-haul passenger traffic in particular. Nevertheless, there is something lacking in these statements as definite otherwise as they may be. Where in them do we find statements of the attempts that are being made to meet automobile or bus competition? Or, to put it in another way, where do we find notations of the attempts that are being made to replace the business lost to the automobile by other passenger business? Are such attempts being made? If they are being made, what are the results?

In a discussion of this kind, we must get down to fundamentals. One of the fundamentals is that the railway loss of passenger business has not been due in any great measure to curtailment of the service. This is borne out by the statistics which do not show any noticeable decrease in passenger train miles or passenger car miles. As a matter of fact, the service has improved; witness notably the restoration of trains eliminated during federal control; the new services, such as the New York Central's Southwestern Limited, the Baltimore & Ohio's new National Limited, the new Crescent Limited between New York and New Orleans, the Great Northern's Oriental Limited, the better schedules for service to California and to Florida, the 6½-hour schedule between Chicago and St. Louis, etc.

Of course, there are several kinds of passenger service. The high grade through service represented by these new trains constitutes one group. There is, second, the local short-haul service; third, the commutation service, and, finally, the special or excursion service. The railways are exerting strong efforts to build up their through services. Commutation business seems to increase whether the railways handling it want it to do so or not. Excursions have not yet been restored to their pre-war popularity. The decreasing short haul service is where the automobile and motor bus competition has proved most effective and where, in short, the problem of decreasing passenger service cost most pointedly. Naturally, putting on new

"crack" through trains will not save the short haul business. In fact, the railways are not trying to save it. Some, to be sure, have put on self-propelled motor cars less with the object in most cases of saving the business than to cut the cost of it. Others have merely cut down the number of trains. One road has been so willing to admit its defeat as to propose taking up a line and substituting motor buses, although this line actually lies within a commutation zone.

The increasing excellence of through service will not necessarily help the railroads to save their short haul passenger traffic. It will help rather to replace it. The question then is as to whether the public is being properly attracted to the fast schedules and the excellently appointed equipment. In other words, is the improvement in the through service being properly advertised? We believe that it is. However, such advertising is a matter of but a few months' standing. During the period of federal control, and until quite recently, there was not much railway passenger advertising. The statistics quoted above have been for 1923 and 1924, in one year of which there was little advertising of passenger service, and in the other not a great deal more. Some of the railways have not yet entirely appreciated the value of advertising. One road that has gained such appreciation attained it in a peculiar and interesting manner. Not so long ago, there was a meeting in a city on that railroad, at which the president of the local chamber of commerce made an address taking the road to task for its poor advertising. "Who would be attracted to our fair city by that picture?" he said, holding up the 1925 summer tourist folder and pointing out the illustration of the bathing beach on which was gathered a throng garbed, not in the alluring costumes of 1925, but in the fanciful clothes of about 1900.

The *Railway Age* can speak knowingly concerning the value of advertising. Fortunately, it can speak dispassionately concerning passenger department advertising because few railroads are going to advertise their passenger service to *Railway Age* readers who, by and large, travel on passes anyway. But we do believe in the value of advertising, and we do believe that one of the reasons that the railroads have not had more passenger business in the past two or three years is because they have not advertised for it as they should have done. The change that has now taken place is a welcome one. We do not believe that the advertisements, often full pages and sometimes in color, now appearing in the general magazines and telling of the attractions of national parks and the other pleasure resorts, which this or that railroad reaches, can be without their effect. Unfortunately, such advertising is costly. The Union Pacific, we understand, plans to spend no less than \$950,000 on it during 1925.

There is another factor in this situation that should not pass unnoticed. This is that it is conceivable that the automobile may in some measure bring traffic to the railroads. It may seem like rashness to make such a statement, particularly after one has traveled over any hard surface road near an urban community on a Sunday afternoon or after one has seen in Florida, in California, in Colorado or in New England, in the tourist season, cars from nearly every state in the Union. Nevertheless, it is true that the automobile has taken people away from their farms and their porches. It has very likely made people want to travel, though of course Americans have always wanted to do that. Mr. Average Man may use his automobile to go 100, 200 or even 500 miles from home, but the man who drives to the far distant parts of the country is the exception. In such cases, if he wants to go he will probably go by rail. This indicates the prospective customer that the railway advertising is designed to

reach. And, as concerns excursion traffic, has any railway man yet explained the reason for the general lack of desire to restore this business to its pre-war proportions? Is the failure to go after excursion business due to inertia or is there some more pertinent reason? With the people's desire to travel and the difficulty of reaching pleasure resorts by the highways in comfort on week-end trips, does not this also offer possibilities beyond those which the railways have succeeded in realizing?

Advertising, of course, is only a part of a broader thing that we call merchandising. The term merchandising includes the proper understanding of what can be sold, the creation of a demand for it, and then the selling of it, assisted as may be by advertising. The automotive industry has been signalized by its merchandising skill. The railroad industry has not. There are a hundred reasons why it has not. First, over-regulation has put undue emphasis on the necessity of reducing costs. A long period of delayed expansion of facilities has minimized the need of selling service. As a matter of fact, the railways have been hard put to it on various occasions in recent years to meet the demands upon them for service, let alone having to go out to seek additional traffic. The conditions now have changed. Sometimes conditions change faster than human nature changes with them. Thus, it is not surprising that an industry which has had to watch every cent of outgo should not excel in such a short space of time thereafter at such a different thing as merchandising. It certainly is apparent enough that in this matter of automobile competition, the automotive interests have shown themselves much better merchandisers than the railroads have.

The railroads by and large have been too ready to admit that they cannot compete with the automobile or motor bus on short haul traffic. How many of them have actually tried to compete? Are the railways willing to admit that this is one case where railway initiative falls down? Or is the short haul passenger business to disappear from the railways as traffic disappeared on the canals in the early days of railroading? We shall look upon this problem as hopeless of solution only when the railways have really tried to meet motor vehicle competition, and this we are not ready to believe they have done as yet.

New Books

Linienführung, by Erich Giese, Otto Blum, and Kurt Risch. 435 pages. 6½ in. x 10 in. *Verkehr und Betrieb der Eisenbahnen*, by Otto Blum, G. Jacobi, and Kurt Risch. 418 pages. 6½ in. x 10 in. Board covers. Published by Julius Springer, Berlin, Germany.

These volumes constitute Volumes 2 and 8 respectively of the Railroad Series of the Handbibliothek für Bauingenieure edited by Robert Otzen. By way of introduction to *Linienführung*, Dr. Blum in Part A, "Eisenbahngeographie," reviews commercial routes and influences before and since the introduction of railroads into "Mitteleuropa" and Germany. Maps and charts supplement the text. In Part B, "Linienführung und allgemeine Bahnanlage," Drs. Giese and Risch collaborate on an extended discussion of physical and economic factors affecting location and construction of railroads, and accounting for costs of construction and operation. Illustrations, maps, charts and tables are included in the text. In *Verkehr und Betrieb der Eisenbahnen*, Dr. Blum in Part A, "Verkehr," establishes an historical and economic background for his detailed discussion of railroad traffic and rates by outlining European traffic characteristics before railroad transportation, and the social and political

aspects of railroad expansion. Rate theories and construction of tariffs are discussed at length. In Part B, "Eisenbahnbetrieb," Dr. Jacobi takes up freight and passenger traffic, the characteristics and equipment requirements of each, and train services that have developed to transport both people and commodities. Station services and requirements and line services are discussed as well as train schedules and make-up. In Part C, "Die Organisation der Eisenbahnen," Dr. Risch presents various factors influencing the construction of railroads by state or private enterprise in various countries; then proceeds to discuss organization of typical state and private systems. The organization of the German State Railways is analyzed together with that of the Swiss Federal Railways as typical of state enterprises, while the Canadian Pacific and the Lübeck-Büchener line are presented as railroad organizations typical of privately-operated systems. Laws of the German Reich, and the various German states and the law establishing the Deutsche Reichsbahn-Gesellschaft (German State Railway Company) under the Dawes plan are cited and summarized, the last (Deutsche Reichsbahn-Gesellschaft) being printed in full. For persons with knowledge of technical German and railroad terms, these books can be of great interest, while persons interested only in factors affecting the social and economic development of nations can find a fairly extended discussion of the parts played by railroads in Dr. Blum's contributions to both volumes.

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

Census of Electrical Industries: 1922, compiled by U. S. Bur. of the Census. Four reports—Electric railways, 266 p., 30 cents; Central Electric Light & Power Stations, 189 p., 25 cents; Telephones, 56 p., 10 cents; Telegraphs, 29 p., 5 cents, of which the first and fourth are of special interest to railroaders containing brief history, and statistics of electrification of steam roads, railroad telegraph systems, and telephone train dispatching. Published by Government Printing Office, Washington, D. C.

Reports on Records of Oil Tank Fires in the United States 1915-1925, by American Petroleum Institute. Conclusions as to prevention, construction of tanks, etc. 41 p. Published by the Institute, New York City.

Special British Railway Centenary Number, Railway Gazette, June 22, 1925. Detailed history of British railroads, with many illustrations. 276 p. Published by Railway Gazette, London, Eng. 2 shillings.

Story of the Burlington, by W. W. Baldwin. Includes illustrations and map. 32 p. Pub. by Chicago, Burlington & Quincy Railroad, Chicago, Ill.

Superheat Engineering Data, sixth revised edition. Handbook on superheated steam, 208 p. Published by Superheater Co., New York and Chicago. \$1.00.

Periodical Articles

Endurance Properties of Metals, by D. J. McAdam. Results of recent experiments in fatigue of metals. *Mechanical Engineering*, July, 1925, p. 566-572.

The Overhead-Cableway Method of Logging, by Spencer Miller. "The overhead-cableway skidder is an auxiliary transporting apparatus acting as a feeder to the railroads." *Mechanical Engineering*, July, 1925.

Letters to the Editor

[The RAILWAY AGE welcomes letters from its readers and especially those containing constructive suggestions for improvements in the railway field. Short letters—about 250 words—are particularly appreciated. The editors do not hold themselves responsible for facts or opinions expressed.]

Display of Current Timetable

CLEBURNE, Tex.

TO THE EDITOR:

A correct timetable is as essential as correct time in train movement, since most lines operate their principal trains under schedule. In order to insure the possession of the latest timetable by each employee engaged in train service, I suggest that current timetable covers should be displayed adjacent to the standard time notice which appears on standard clocks. This would permit a trainman to check the timetable that he holds with the one officially displayed as being the current one at the same time that his watch is checked against the standard clock. As no trains are moved over any part of the line until a watch comparison is made and reported, there would be little opportunity for an employee to go on duty with an obsolete timetable. The timetable cover might be placed on the inside of a glass door below the standard clock and secured by adhesive tape at each corner. With the change in timetables on any division or district, new cards would be applied and signed for by the operator on duty where the standard clock is located.

D. Ross,

Fuel Supervisor, Gulf, Colorado & Santa Fe.

College Graduates and Unionism

KANSAS CITY, Mo.

TO THE EDITOR:

Although not a railway employee, I have been a reader of the *Railway Age* and its predecessor for more than 20 years and have followed the discussions as to the status of college men in railway work with exceptional interest, especially of late because of the fact that my son is graduating from college and desires to enter railway service. However, will he secure employment and, of necessity, join some union where his personality is submerged and his ability gaged by the minimum ability to perform or produce on the part of the most mediocre employee belonging to that union or will he be able to secure employment where he can give the maximum service and retain his personality and his identity? Will he be forced to take refuge in seniority, as a sinecure, or will he be able to forge ahead and stand or fall on his own merits or demerits?

I cannot see where trade unionism can appeal to college men for it is foreign to their principles if they have been through the average college with average ideals of Americanism and individualism. If they start at the bottom in the operating or mechanical departments, where the field is most open, they are virtually forced to ally themselves with some union. In the engineering or technical departments, which are the most closed to the college man, they can avoid unionism and syndicalism. In this connection I do not mean that the latter departments are closed to college men in the strict sense of the word, but they are already filled with highly trained men (probably college

men) who hold their positions on merit or lose them from demerit so that when a man once secures employment in the technical departments he is liable to stay there without seniority or trade unionism help or defense until he goes on the pension list, wearing out rather than rusting out. Therefore, admission to the technical side is by rare chance and the positions of rare value because of the fact that merit counts and college men are trained to make good on their merits and their ability to think and act right.

I have never seen this phase of the situation discussed in the columns of the *Railway Age* but it has often occurred to me. I hope, therefore, that it will merit attention from those who have been giving much thought to this phase of a very vital question.

B. C. BIGGERSTAFF,

Associate Editor, Kansas City Daily Drovers Telegram

Railway Employee Stockholders

BANGOR, Me.

TO THE EDITOR:

I have just read the article in the *Railway Age* of May 23 on the above subject and am heartily in accord with it. We have had an arrangement for several years past by which we buy our own preferred stock for our employees, allowing them to pay for it so much per month. In addition to this we have an arrangement with one of the old established savings banks by which we make deductions on authority from individual employees from their pay and deposit the same to their credit in this savings bank; in other words, we give our employees a choice between buying our own preferred stock, which pays seven per cent, or depositing a certain amount of their earnings for them in the savings bank on which they get interest at the rate of four per cent per annum.

PERCY R. TODD,

President, Bangor & Aroostook.

Should Ticket Clerks Sell Insurance?

CHICAGO.

TO THE EDITOR:

The newspapers report that R. H. Aishton, in addressing the meeting of safety superintendents, "pointed with pride" to the great number of passengers carried by the steam railroads annually and the extremely small number of fatalities—the claim being made that riding on a railroad train is safer than walking on a sidewalk. How can the railroads reconcile the figures given by Mr. Aishton with what they do in their ticket offices?

A few days ago a ticket clerk at one of the railroad stations in Chicago, after selling a ticket involving a trip of about 24 hours, asked the customer when he handed him his change, whether he didn't want an accident insurance policy for \$5,000, at a cost of 25 cents for 24 hours. The customer said no, he thought railroading was pretty safe these days. In other words, this customer of the railroads had more confidence in the railroads than the railroads themselves.

Hasn't the time gone by when railroads ought to engage in this kind of business? The income to the railroad is very small and the railroads can afford to pay the ticket agent for his entire time in their interests and not for the purpose of selling insurance at the prohibitive rate of \$91 per year for \$5,000. The railroad customer can go to the market and buy his insurance for an infinitesimal part of the sum charged by the railroads.

It seemed to the writer, who overheard this conversation, that it was ill becoming, to say the least, for a railroad employee to suggest to a man at 11 p. m. that he was not going to have a safe trip.

RAILWAY EMPLOYEE.

Selling Stock to Employees

CAMBRIDGE, Mass.

TO THE EDITOR:

There is a grave possibility that "animosity and ill-feeling will be engendered" whenever a railroad employee who has bought shares of his employer's stock finds it falling in value. This view, voiced by a southern railroad president, quoted in the *Railway Age* (page 1260) where it reports the action of 14 railroads in selling stock to employees, calls to mind the fact that the ethics and equity of these stock-selling schemes never yet have had any fair expression. To make the matter clear, all around, it would be well to recall a few fundamental principles:

1. The business of most railroads is fluctuating and more or less risky. The stockholders take substantially all of the risk; the bondholders and other parties in interest take practically none.

2. A small investor does a grave injustice to himself if he takes much risk of this kind. Large stockholders, who legitimately take such risks, modify the situation by participating in ownership of bonds or preferred stock.

3. Very few employees can be other than small investors.

4. Small stockholders in large corporations rarely have any effectual way of making their wishes felt in the board of directors. Practically, they can do nothing, except to vote as the officers desire to have them vote. To combine on an opposition ticket would be an unheard of proceeding.

5. From all of which it is quite evident that, except under the pleasant skies of good earnings and general good fortune, all around, the only definite favorable result that can be depended upon to flow from stock-buying by employees is to arouse their minds to the need of some vigorous and intelligent thinking on the general railroad question; and the duty of the citizen to take a real interest in it.

When heavy stockholders in a large railroad are seen to be gradually "unloading" through a series of years, it is very much like fraud to go before the employees and advise them to buy such stock.

One might say, of course, that an engineman or a station agent ought to own at least one share in the stock of his road, even if the investment is not profitable, just to make sure that his interest in the welfare of the company does not become dulled by ignorance and by absorption in other matters; but it is to be feared that not many such men would have the broad-minded philosophy to thus submit to a financial penalty for being a partner with their employer.

Except on the Pennsylvania the number of employees buying stock is small compared with the total number in the service. To give to this matter the genuine illumination that it needs there should be published a full and lucid account of how the men themselves feel about it. Large numbers of them ought to be questioned. For example:

How many shares do you own?

When did you buy them?

Has the value risen or fallen?

What proportion does this railroad stock bear to your total investment—or to your total wealth (including your home, if you own one)?

Are you pleased with the idea?

Do you know of any employees who own stock and are not pleased?

Are they men whose opinions are intelligently formed and worthy of respect?

How well are you acquainted with your three nearest superior officers?

Has the stock-ownership made acquaintance easier?

Has it had any effect in making pleasanter the relations of employees, one with another?

J. C. HARVARD.

A Popular Condensed Time-Table

CHICAGO.

TO THE EDITOR:

A primary requisite in small advertising circulars is the quality (or qualities) which will induce the right kind of persons to keep them;—to get recipients to take whatever action may be necessary to have the leaflet, or whatever it may be, at hand for repeated perusal. One means of doing this is to tie the advertisement to a time table. I have seen varied examples of this; but a recent one, worth special notice, is a small time-table of which I enclose a copy. It is for a road 90 miles long, yet it is only the size of a business card. It is the card of the Pacific & Idaho Northern, 5½ in. wide by 3¼ in. high [here shown reduced in size]. It is an example of

P. & I. N. Railway - Summer - Passenger Service									
Week-End	No. 3	No. 1	No. 2	No. 4	Week-End	Round Trip	Wagon To	Wagon To	Wagon To
Round Trip	Daily	Daily Except	Daily Except	Daily	Round Trip	Wagon To	Wagon To	Wagon To	Wagon To
From	Leave	Leave	Leave	Leave	From	Wagon To	Wagon To	Wagon To	Wagon To
Midvale	8:15 P. M.	7:30 A. M.	WEISER	4:10 P. M.	Midvale	11:47 A. M.	Midvale	11:47 A. M.	Midvale
and to all sta-	4:30 P. M.	8:00 A. M.	Midvale	8:46 P. M.	Cambridge	10:31 A. M.	Cambridge	10:31 A. M.	Cambridge
tions \$2.64 per	4:50 P. M.	8:23 A. M.	Cambridge	8:23 P. M.	Goodrich	10:10 A. M.	Goodrich	10:10 A. M.	Goodrich
mile. Good go-	5:15 P. M.	9:40 A. M.	Goodrich	1:59 P. M.	Council	9:48 A. M.	Council	9:48 A. M.	Council
ing Saturday.	5:35 P. M.	10:10 A. M.	Council	1:30 P. M.	Starkey	9:06 A. M.	Starkey	9:06 A. M.	Starkey
Good return-	5:54 P. M.	10:34 A. M.	Fruitvale	1:11 P. M.	Fruitvale	8:59 A. M.	Fruitvale	8:59 A. M.	Fruitvale
ing Sunday or	6:01 P. M.	10:42 A. M.	Starkey	1:00 P. M.	Starkey	8:58 A. M.	Starkey	8:58 A. M.	Starkey
Monday.	6:14 P. M.	11:05 A. M.	Tamarack	12:21 P. M.	Tamarack	8:55 A. M.	Tamarack	8:55 A. M.	Tamarack
	6:54 P. M.	11:45 A. M.	New Meadows	12:01 P. M.	New Meadows	8:55 A. M.	New Meadows	8:55 A. M.	New Meadows
	Arrive	Arrive	Leave	Leave	And Return				
O. S. L. TRAINS AT WEISER									
West Bound									
Oct. 19, 1925	20	4:00 P. M.	18	2:25 A. M.	20	4:00 P. M.	18	2:25 A. M.	20
	17	4:10 A. M.	38	8:31 A. M.	17	4:10 A. M.	38	8:31 A. M.	17
	25	8:19 P. M.	24	8:38 P. M.	25	8:19 P. M.	24	8:38 P. M.	25
ONE WAY SUMMER EXCURSION FARES, DAILY BETWEEN									
Weiser and Midvale	50				Weiser and Midvale	50			
" " Cambridge	\$1.50				" " Cambridge	\$1.50			
" " Council	\$1.80				" " Council	\$1.80			
" " Starkey	\$2.10				" " Starkey	\$2.10			
" " Tamarack	\$2.40				" " Tamarack	\$2.40			
" " New Meadows	\$2.70				" " New Meadows	\$2.70			

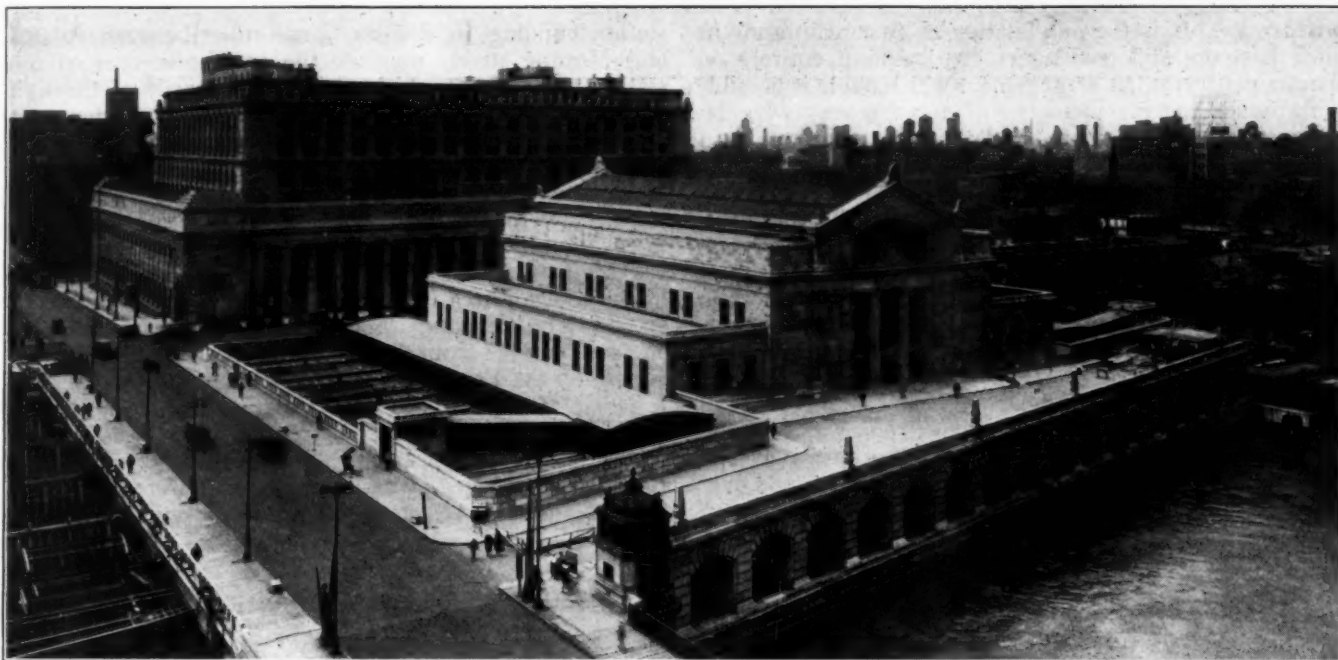
condensation which has proved successful in making a combined time-table and advertisement that people will not throw away. It is small enough to go into a pocket-book and is on cardboard heavy enough to withstand wear and handling. The reverse side bears an advertisement of the company's gas motor car, which runs on Schedules 3 and 4, and of the scenic and commercial features of the territory traversed by the road.

This 90-mile road extends into the country north of Weiser, Idaho, which is on the Oregon Short Line, west of Boise; and the time-table is brought within the compass of the space available on a small card by omitting 15 of the 24 stations.

So far as can be judged at this distance, the seven way-stations named on the card are no more prominent than the 15 which are omitted; the point is that an incomplete table, printable in readable type within small space, has been made sufficiently useful to be worth preserving. The cardboard is stiff enough to invite compliance with the request to tack it up; and the table is not without usefulness even at stations which are not shown upon it.

A larger time-table could be printed on this card by transferring to the other side some of the advertising which now appears in the margin. The advertising matter on the reverse can, of course, be changed with each new issue.

L. MICHIGAN.



The Station Presents an Impressive Appearance from the River

Noteworthy Passenger Terminal Completed at Chicago

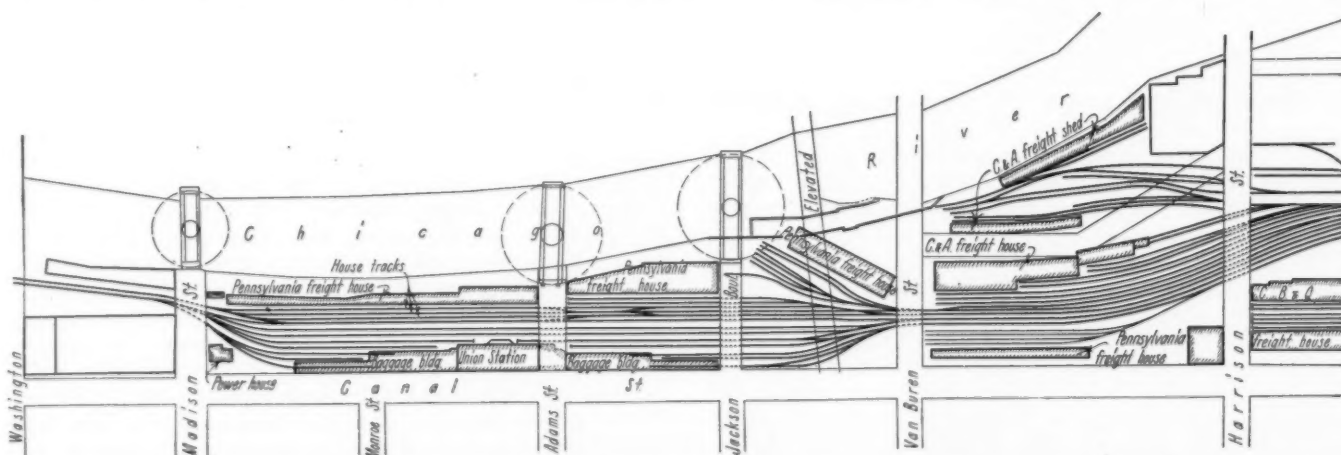
Union station provided for Pennsylvania, Burlington, St. Paul and Alton roads

By Walter S. Lacher

THE opening of the Chicago Union Station on May 15 marked the successful completion of a \$75,000,000 project which had its inception nearly 15 years ago. It represents the replacement of a passenger

the heavy requirements of a rail gateway in a large city.

The importance of this station is definitely established by the fact that it serves as a terminal for four railroads in one of the world's largest cities. In point of number



Map of the Old Station, Showing How It Was Hemmed in by the Freight Facilities of the Pennsylvania, Burlington and Alton

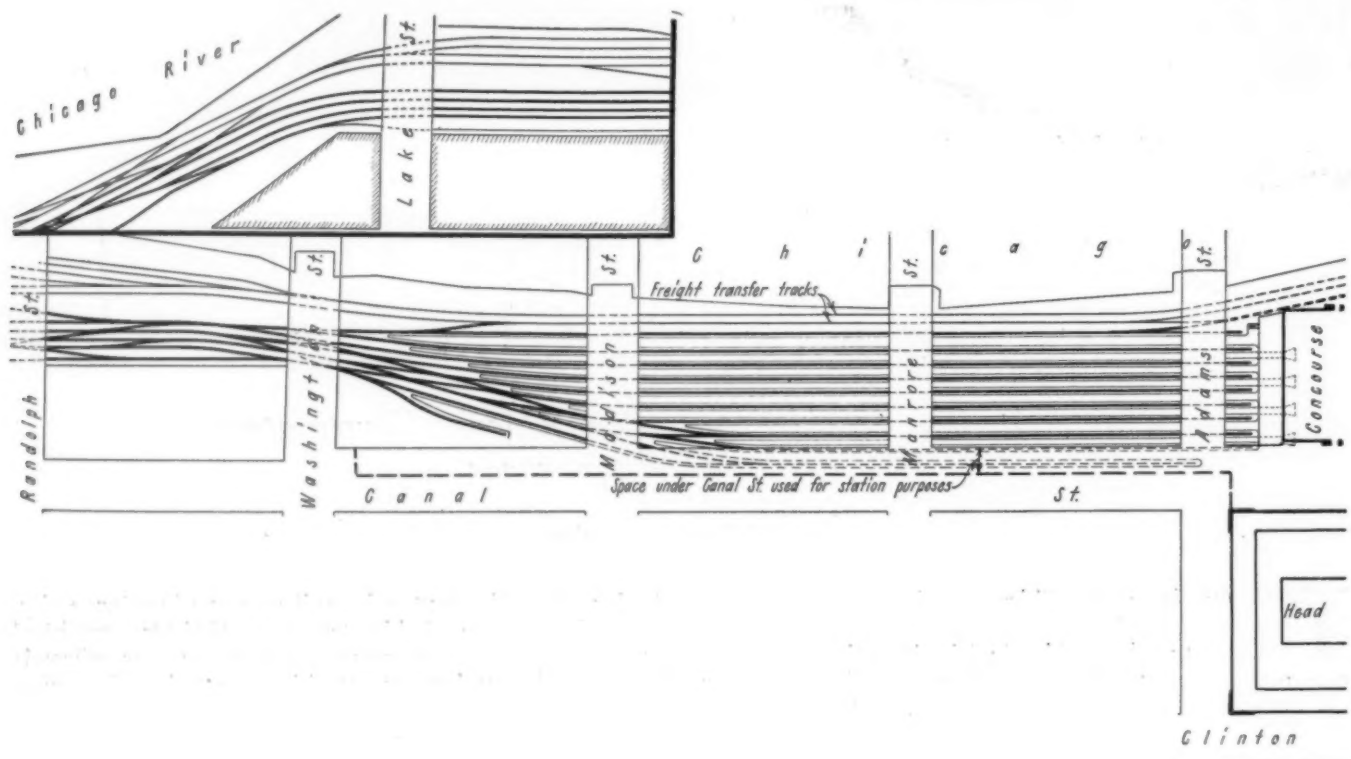
terminal, which had long served inadequately to meet the demands imposed on it, by a new plant of greatly increased capacity embodying the latest developments in the multifarious facilities which must be provided to meet

of station tracks it ranks fifth in the United States. From the standpoint of design it embodies much that is both novel and forward looking. It is the only double stub station in America, having two separate grids of plat-

form tracks. It is the only station of first magnitude in which baggage and passengers are handling entirely on separate platforms, an arrangement which made it possible to introduce an ingenious ramp arrangement whereby trucking between platforms and the baggage room on a lower level is accomplished without the use of elevators. It embodies the most complete station facilities for handling mail found in any railway terminal on the continent. It is one of an extremely limited number of great passenger stations in which the platforms, concourse and waiting room are on a common level. It is provided with an entirely new form of train shed. It includes a system of interior driveways and vehicle platforms that practically eliminate the use of street curb space by street vehicles in the loading and unloading of passengers, mail and baggage. It includes a combined office and station building, which provides for what will be ultimately one of the most intensive developments of railway lands ever undertaken. But even more noteworthy than any of

station building fronted on Canal street between Adams and Monroe streets opposite the transverse axis of the station track layout which consisted primarily of through tracks connecting at either end with two approaches, one from the north and the other from the south. The Fort Wayne line of the Pennsylvania, and the Alton and the Burlington lines entered from the south over a four track line located on property formerly owned jointly by the Fort Wayne and the Alton, between Van Buren and Twenty-first street. The Burlington operated over this line as a tenant to a junction with its own line at Sixteenth street. The Panhandle line of the Pennsylvania and the St. Paul entered from the north on a two track line owned jointly by the Fort Wayne, the St. Paul and the Chicago & North Western, as far as a point on Canal street near Carroll avenue.

The tracks throughout this entire station area, except for a short distance at its northerly end, were depressed, all east and west streets being carried over them on via-



Map of the North End of the New Terminal. A Portion of the North Approach Is Shown in the Upper Left Corner

these distinctive features is the impression created by a study of the station as a whole and the problems which were imposed in the development of an effective terminal in the face of unusually severe obstacles.

The new station is owned by the Chicago Union Station Company, incorporated in 1913, the stock of which is held in four equal blocks by the Chicago, Burlington & Quincy; the Chicago, Milwaukee & St. Paul; and two corporate units of the Pennsylvania system. It serves as the Chicago passenger station for these three systems and a single tenant railway, the Chicago & Alton. It superseded a station built in 1880 which was owned by the Pittsburgh, Ft. Wayne & Chicago (the Pennsylvania) and used by the other railroads as tenants.

Old Station Outgrown

The old station was located on a strip of ground about 134 ft. wide adjacent to the east side of Canal street between Madison street and Van Buren street. The old

ducts which served also as the west approaches to bridges over the Chicago river which lies just east of the station property. The station building had a waiting room on the street level with three stairways leading down to a narrow concourse flanking the west side of the train shed. The physical layout was that of a through station but from the operating standpoint it was strictly a terminal station for all of the roads using it. However, the station tracks were all so short that long trains frequently occupied portions of the tracks both to the north and south of the axis of the station and consequently the handling of trains was much the same as in a through station.

Other Sites Were Urged

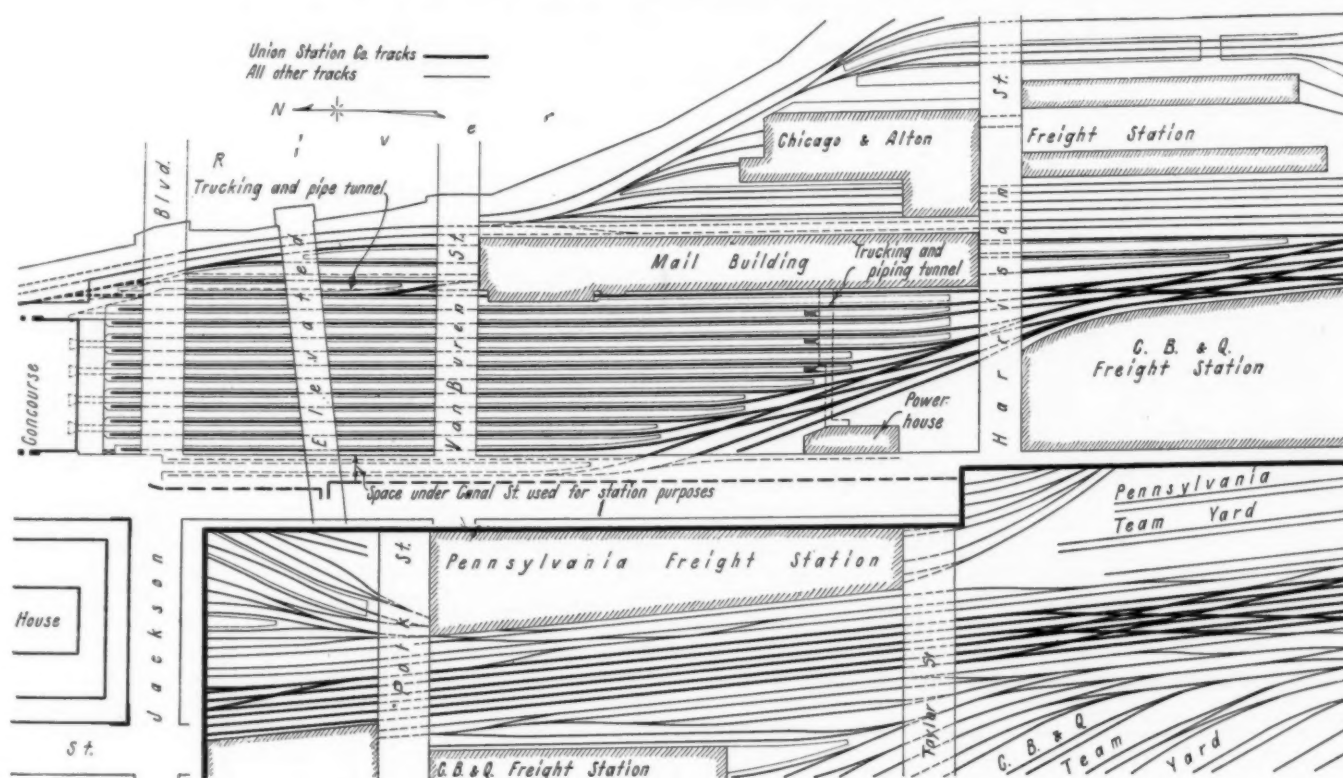
Concerted efforts were made at one time during the course of negotiations preliminary to the development of definite plans for the new project, to place the station on an entirely new site at a considerable distance from the location of the old one. This was objectionable from

the standpoint of the railways for a number of reasons, chief among which is the strategic position of the original site immediately west of Chicago's business center and adjacent to east and west streets which constitute the main arteries of traffic between the loop district and the city's great west side. Furthermore, any project for a change in the location of the station was confronted with one important obstacle, the fact that the station has two approaches. For, whereas the problem of the replacing of a terminal of the stub type has frequently been simplified by withdrawing to a more favorable location on the single approach, the necessity for maintaining two approaches complicated rather than simplified the problem.

However, the various conditions which made the old site a favorable one from the traffic standpoint imposed serious obstacles in the development of an adequate plan for a new terminal as well as the conduct of the actual construction. Therefore, the decision to build the new station on the site of the old one immediately presented a

been enlarged sufficiently to effect a great increase in capacity and to permit of an entire elimination of the fundamental defects in the old plan. The primary requisite, that of adequate track capacity, was fulfilled by a process of expansion. The width of the track layout was increased to occupy the entire space between the east side of Canal street and the west bank of the Chicago river, while the length was extended sufficiently to avoid the paradox of a through layout for a station that serves as a terminal for all trains entering it, that is, to provide independent station tracks for trains entering from the north and from the south with adequate capacity to accommodate the longest trains and still leave room between the ends of these two groups of platform tracks to provide ample facilities for the dispatching of passengers and baggage to and from trains.

As it was neither practicable nor desirable to locate the entire headhouse facilities of the station entirely in the space between the two groups of tracks, only the passen-



Map of the South End of the New Terminal, the South Approach Being Shown at the Lower Right

number of serious restricting conditions: (1) high land values, making the acquisition of the necessary additional ground area exceedingly expensive; (2) heavy street traffic, definitely precluding the closing of any streets crossing the terminal area—in fact, the terms of the terminal ordinance required the opening of one additional street (Monroe street) and the widening of four existing streets; (3) the impracticability of making any radical change in the relative grades of the street and tracks; (4) the requirement that the layout of the station must be such that the station tracks would serve two approach routes; (5) the conduct of the construction work in and around the old station without interference with its operation.

Outline of the Plan Adopted

In consequence of these limiting conditions, the general track arrangement of the new station is basically the same as that of the old one, except that the layout has

ger concourse was placed in the block bounded by Canal street, Jackson boulevard, Adams street and the river, the main waiting room and the necessary auxiliary facilities being accommodated in a separate structure the only logical space available for this purpose, namely, the block on the west side of Canal street opposite the concourse, the two units of the station being connected by utilizing the space under the street between the two.

Exterior Appearance

In outward appearance the headhouse and concourse are two separate structures of distinctly different outlines. Each occupies a block by itself and is surrounded on four sides by streets. However, the architectural treatment of the two is such as to present a harmonious effect, Bedford limestone being used for the exterior walls of both. The concourse structure is purely a station utility with its exterior outlines determined by the requirements of a spacious and lofty concourse, while the headhouse building has

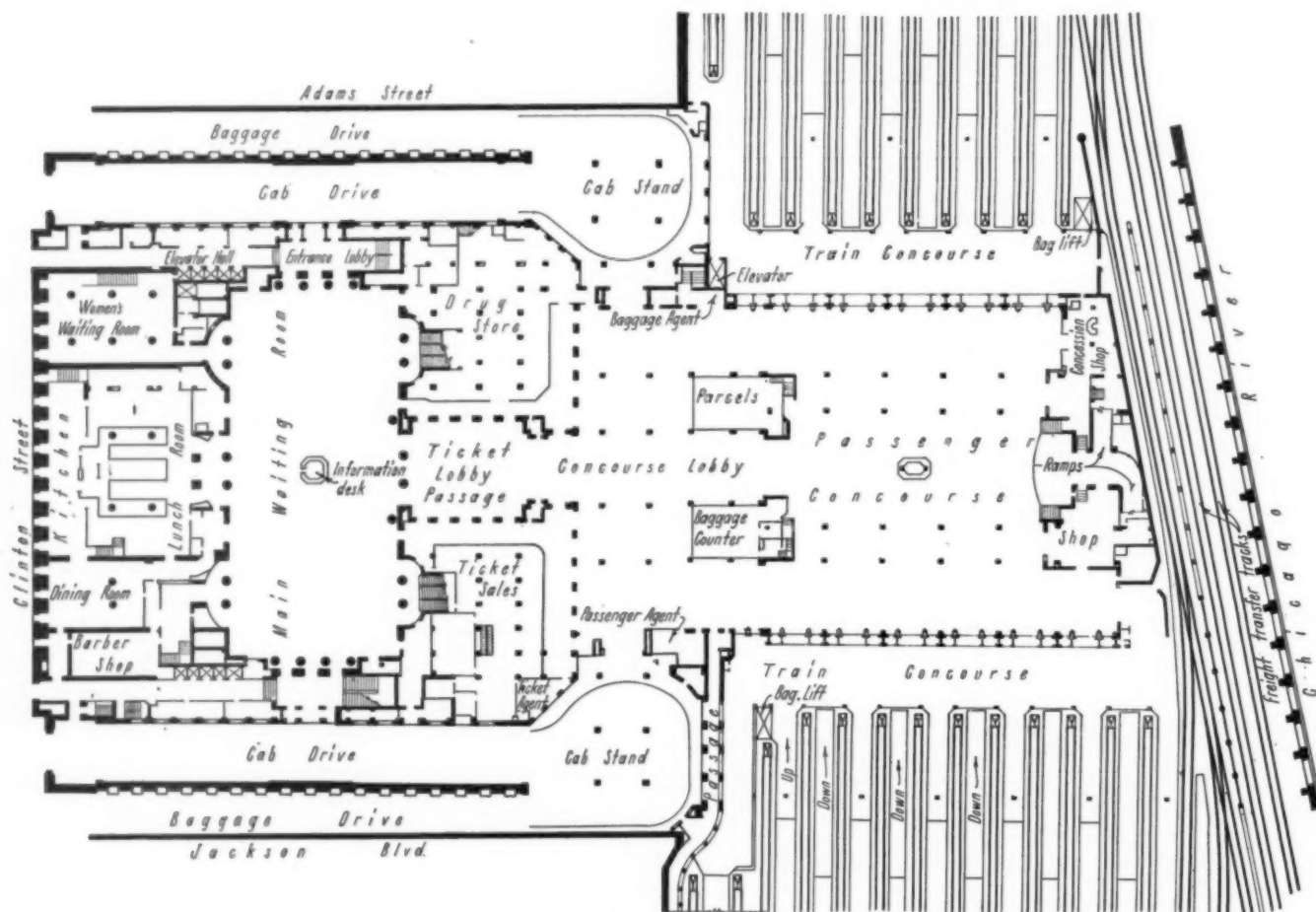
its proportions fixed by the demands of a dual occupancy, that of station facilities in the lower portion and offices above.

The site is one that presents an unusually fine setting for a monumental piece of construction. The adoption of a low type of train shed, the construction of viaducts without structural members above the roadway level and the presence of the Chicago river immediately east of the station property afford unusual opportunity to view the headhouse and concourse from the south, east and north. The east elevation has been particularly enhanced by introducing a driveway between the east face of the concourse structure and the river, connecting Jackson boulevard and Adams street, with its supports along the river side emphasized by an arcade of 16 massive arches, sup-

above the parapets surmounting the walls, but the parapets of the wings are of sufficient height to conceal their flat-arch roofs.

The Headhouse Is a Large Structure

The headhouse structure comprises a hollow square with a central court, the base of which is occupied by the main waiting room. The base of the building occupies the entire block bounded by Canal, Jackson, Clinton and Adams streets, and has a length of 372 ft. north and south by 319 ft. 10 in. east and west. However, the mass of the building above the base, that is, the outline of the office building portion, which has been carried to a height of eight stories, is set back 30 ft. 4 in. on the Canal street side, 39 ft. on the Clinton street face and similar amounts



Station Level Plan of the Headhouse and Concourse

ported on the dock wall along the river to afford an appropriate architectural base, while the parapets or railings of the street viaduct are of sufficient height to conceal the train sheds without interfering with the view of the buildings.

The concourse comprises a central mass extending to a height of 108 ft. above the street level, of applied classic outline with its main axis east and west and flanked on the north and south by low wings. The main central portion has a flat gable roof and the east and west faces are treated as ornamental doorways, emphasized by two Roman-Doric columns with Doric pilasters on either side. The entablature above these columns and pilasters is carried entirely around the building at about three-fourths of its height and is surrounded by an attic emphasized on the east and west faces by a segmental arch opening occupied in part by a large clock. Saw-tooth skylights in the gable roof of the main portion are readily discernible

on Jackson boulevard and Adams street, giving the effect of a terraced space extending practically to the fourth floor level. On Canal street this is treated as a portico comprising a colonnade of Roman-Doric columns 39 ft. high. Similar treatment is used on Clinton street except that the building wall is flush with the backs of the columns. The treatment on Jackson boulevard and Adams street is more severe and consists primarily of a continuous row of open windows which afford the necessary ventilation for the taxi driveways, which will be described later. Architectural emphasis is given to the two entrances to these driveways on the Clinton street corners by ornamental pavilions and for the sake of symmetry similar construction is provided on the two east corners.

Street Grades Influence Plan

In order to obtain a clear conception of the station plan it is necessary to have a definite understanding of the

arrangement of the street grades in their relation to those of the tracks and to the Chicago river. The water level is normally at about Elevation minus 1.0, Chicago city datum, while the streets on both sides of the river are at an elevation that averages about plus 15. However, to obtain adequate underclearance the roadways of the river bridges have been raised to an elevation ranging from 20 to 26, making it necessary to provide ascending grades on all streets approaching the river bridges. But on the west side of the river the street grades are continued at the higher elevation to the east side of Canal street to afford adequate overhead clearance for the station tracks. From the east side of Canal street the east and west streets descend to Elevation 15 at Clinton street, one block west, while Canal street has an elevation ranging from plus 22 to plus 26 from Monroe street to Taylor street, with descending grades beyond these limits to meet the normal street grades at Washington street and Roosevelt road, respectively.

Because the tracks are below the streets and owing to the necessity for dividing the headhouse facilities into two units separated by Canal street, it was necessary and also most desirable to place the main floor of the station below the street level since this affords the operating advantage of having the station on the same level as the tracks and, what was more important, provides a direct connection between the station facilities east and west of Canal street by a connecting concourse under the street. Accordingly, the floor of the passenger concourse east of Canal street was placed at Elevation plus 8, and the floor of the main waiting room in the center of the headhouse west of Canal street at Elevation plus 10, with a scarcely perceptible slope on the floor of the connecting concourse between the two. The baggage room occupies a basement underneath the passenger concourse and the east end of the concourse lobby west of it, at Elevation minus 8.7.

Provide Numerous Entrances

With these conditions fixed the interior arrangement was influenced by the all-important requisite of effective and convenient entrances and the maximum simplicity of the entire interior arrangement. Special pains were taken to insure that the routing of the passengers through the station would not only be obvious but would also afford direct access to the various facilities with practically no opportunity for confusion on the part of even the most inexperienced traveler. It is the opinion of the officers of the union station company that the efforts and expense incurred in developing the plan have been entirely warranted by the operating results obtained since the station has been placed in service.

The main waiting room is 100 ft. by 269 ft., back to back of the balconies, at each end, in the exact center of the block bounded by Canal, Clinton and Adams streets and Jackson boulevard. The passenger concourse is 213 ft. long by 192 ft. wide with its longitudinal axis east and west. It is flanked on the north and south by train concourses 36 ft. 9 in. wide abutting on the ends of the station platforms. Under Canal street immediately west of the passenger concourse and connected with it by three broad archways is the concourse lobby, a space 192 ft. north and south by 100 ft. east and west, and continuing west from this on its east and west axis is the ticket lobby passage 90 ft. long by 55 ft. wide, which serves with the central portion of the concourse lobby as the main corridor connecting the waiting room with the concourse lobby and the passenger concourse.

Both Stairways and Ramps in Concourse

The concourse has two main entrances from the street level. Doorways in the east and west faces fronting on

Canal street and the river drive, respectively, communicate with balconies overlooking the interior of the concourse, from which duplicate stairways to the left and right lead to the station floor level. These two entrances are supplemented by two others on Jackson boulevard and Adams street, respectively, near the east end of the building where doorways in two kiosks afford entrance through two ramps descending on moderate grades to the east and west axis of the building where they join at the floor level and emerge into the concourse through a wide archway directly under the balcony of the east stairway entrance.

The main entrance to the headhouse comprises duplicate entrance lobbies 40 ft. wide by 85 ft. long on Canal street, 70 ft. 10 in. to either side of the east and west axis of the building. These lobbies enclose broad stairways which lead directly to the waiting room. But more important than these entrances are the facilities for access by taxicabs, which were developed in a most effective manner by taking advantage of the variation in street grades. With Clinton street at Elevation 15, Canal street at Elevation 26 and the concourse at Elevation 8, it was possible to construct two taxi driveways entering the building at the two Clinton street corners with ramps just inside the north and south walls of the building leading to cab stands at the north and south ends of the concourse lobby directly under Canal street at the concourse grade. These taxi ramps may also be used to load and unload passengers at entrance lobbies on the north and south axis of the building that lead directly to the north and south ends of the main waiting room. Arcade entrances are also provided for pedestrians paralleling the taxi ramps and leading from Clinton street to the main waiting room.

Each taxi entrance is also used for access to the baggage and express rooms in the basement by means of a second leg of each ramp extending west outside the first leg and under the sidewalks on Jackson boulevard and Adams street, respectively, to Clinton street, thence along under the walk on that street to a junction of the two driveways on the east and west axis of the building and thence eastwardly to the baggage and express loading platform in the basement. These drives have an aggregate length of a half mile, all within the walls of the building and all paved with brick.

Separate Entrances to Office Building

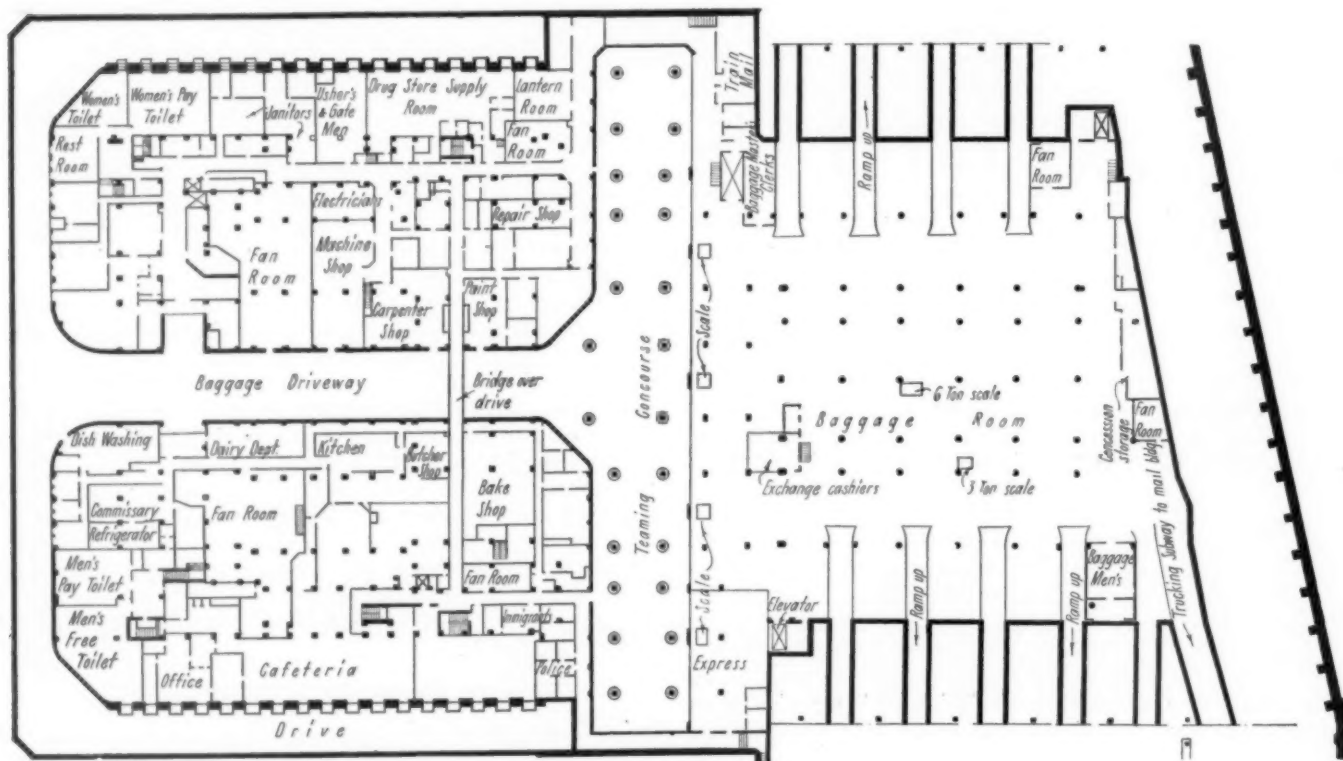
To insure an effective segregation of the dual functions of the headhouse, that of a passenger station facility and a large office building, special pains were taken to isolate the entrances to the office building portion of the structure entirely from the station facilities. Accordingly, entrances to the offices have been provided in the center of the Jackson boulevard and Adams street sides of the building at a considerable distance from any of the entrances to the station proper. By providing for a flight of six steps from the sidewalk level, access was obtained to loggias with floors at Elevation 23.5, or sufficiently above the level of the inclined driveways from Clinton street so that these loggias span the driveways with adequate clearance for the vehicular traffic underneath. These loggias lead to entrance lobbies abutting on the ends of the waiting room but at an elevation of 13 ft. 9 in. above the waiting room floor level so that they give the general effect of balconies overlooking the waiting room. To the west of these loggias are corridors leading to duplicate banks of five Otis elevators each. This number affords adequate service to the office space in the building as now completed to a height of eight stories, but provision has been made for the addition of five more elevators in each group at any time that the height of the building is increased.

The auxiliary facilities of the station have been located with a view to the convenience of the patrons, taking into

particular consideration the use which the various classes of passengers desire to make of them. The passenger concourse has been kept entirely clear to afford ample unobstructed space for the movement of passengers to and from trains, particularly those using suburban service of the various railroads, who enter and leave via the ramps or the concourse stairways, also outgoing passengers already having tickets, who enter the station in taxicabs and board trains immediately, or arriving passengers who depart at once in taxicabs, or via the concourse exits.

The parcel checking stand and the baggage counter are located in the concourse lobby to the north and south of the central passageway, while the ticket lobby is located between the main waiting room and the concourse lobby on the south side of the ticket lobby passage where it is within easy reach of passengers entering the station in taxicabs as well as patrons occupying the waiting room.

other to the north. The south group, which is used by the trains of the Burlington, the Alton and the Pennsylvania, comprises 14 passenger tracks, while the north group, which is used by the trains of the St. Paul and a few trains of the Pennsylvania, embraces 10 tracks. Just east of the 14 passenger tracks in the south group are 5 tracks which serve the railway mail terminal, a long, narrow building located between Harrison and Van Buren streets. One of these is a through track extending the full length of the passenger tracks and passing to the east of the concourse to a connection with the easterly track of the north station group. The other four are stub tracks, two at the south end and two at the north end of the mail building, the two south tracks connecting into the south approach and the two north tracks into the track connecting with the north group. This arrangement affords the necessary access to the mail terminal tracks for



Basement Plan of Headhouse and Concourse

The other facilities immediately adjacent to the waiting room are those ordinarily required only for passengers who must spend some time in the station. These include a restaurant and supplemental accommodations for men and women on the west side of the waiting room.

A doorway in the center of the west wall leads to a large lunchroom for quick service while a corridor from the same doorway connects with a smaller dining room for more formal service. North of the entrance to the restaurant is a doorway for entrance into the women's waiting room, toilets and lavatories, while to the south a doorway opens into a lobby for access to a barber shop and by a stairway to a men's toilet room in the basement. No provision has been made for a men's waiting room or a smoking room, studies of large stations throughout the country indicating that the smoking room serves no essential need and is difficult to supervise and maintain in a cleanly condition.

Station Tracks in Two Groups

As stated previously, the station tracks are arranged in two groups, one to the south of the concourse and the

the handling of mail trains or cars entering or leaving the station via either approach.

The passenger tracks in the station have varying lengths so that they are capable of accommodating 7 to 18 car trains, with locomotives. The capacity of the passenger tracks is 191 cars at the south end and 141 cars at the north end.

Separate Baggage and Passenger Platforms

The distinctive feature of the track layout is the provision for a platform on each side of each track, alternate platforms being designed to serve exclusively as baggage and passenger platforms, respectively. The tracks are spaced 23 ft. 3 in. center to center across the passenger platforms, which are 13 ft. 9½ in. wide, and 21 ft. 3 in. across the baggage platforms, which are 10 ft. 7 in. wide.

The separation of the passenger and baggage platforms has the advantage that it permits the establishment of independent levels for these platforms at a height most suitable for the particular purpose. The baggage platforms were given a height of 1 ft. 8 in. from the top of rail to afford a reasonable height of baggage trucks

constructed with their platforms at car floor level. In the cases of passenger platforms consideration was given to their construction to car floor level, but owing to through car traffic movement involving the use of cars from various connecting railroads in the west it was found that high platforms would entail extended changes in equipment by roads that do not use the station. Consequently it was decided to adopt a low passenger platform but with a type of construction that will readily permit of a change to high platforms whenever it is found desirable. These platforms are now constructed to a height of $7\frac{3}{4}$ in. above the top of rail with ramps on an ascending grade of 7.12 per cent to connect with the concourse floor level. However, as this floor level is approximately five feet above the track level a future change to car floor level will have no other effect than to reduce the grade of the connecting ramps.

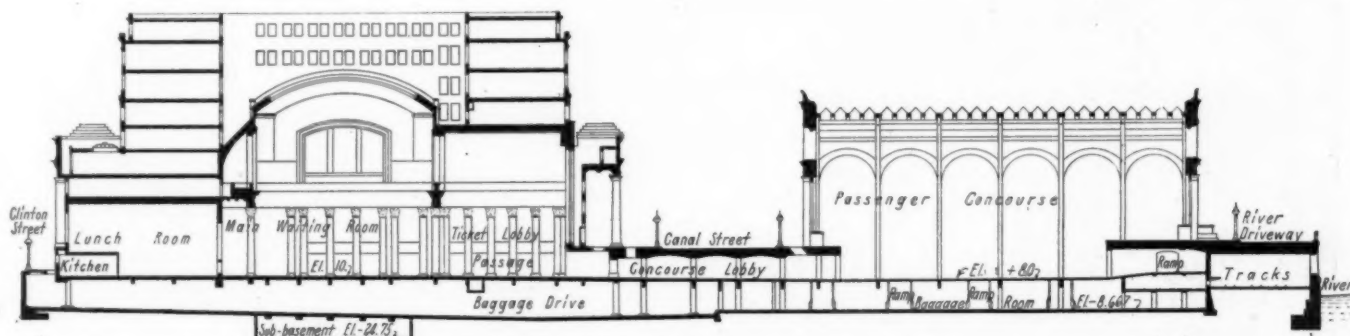
By far the most advantageous feature of the separation of passenger and baggage platforms is the opportunity it affords for direct access to the baggage room in the basement without the use of elevators, since this arrangement made it possible to introduce ramps at the ends of these platforms descending on a grade of 6.75 per cent to the baggage room floor level. These ramps are 10 ft.

travertine. The exact center of the waiting room is occupied by an octagonal information counter with a pedestal in the center affording a support for a four-face clock. The counter and the clock standard are of travertine fleuris marble. Twenty double benches of American walnut afford a seating capacity of 450.

The ticket lobby passage and the two main stairway lobbies on either side of it are also finished with travertine stone with the exception of the ceilings which are of coffered plaster. Similar treatment is used in the north and south entrance lobbies and in the office building entrance lobbies directly above them. The stairways from Canal street do not occupy the entire width of the stair lobbies but afford space on either side for balconies $8\frac{1}{2}$ ft. wide at the street level to permit access to concession spaces reserved for shops.

A Unique Rest Room

Along the west side of the waiting room are three large rooms facing on Clinton street, all of which have a height of 40 ft. with large windows occupying the upper half of the west or Clinton street wall. The north room is 54 ft. by 70 ft. 5 in. and serves as the women's waiting or rest room. Special pains were taken to obtain a deco-



A Vertical Section Through the East and West Axis of the Headhouse and Concourse

5 in. wide and can be used simultaneously by trains of trucks moving in opposite directions.

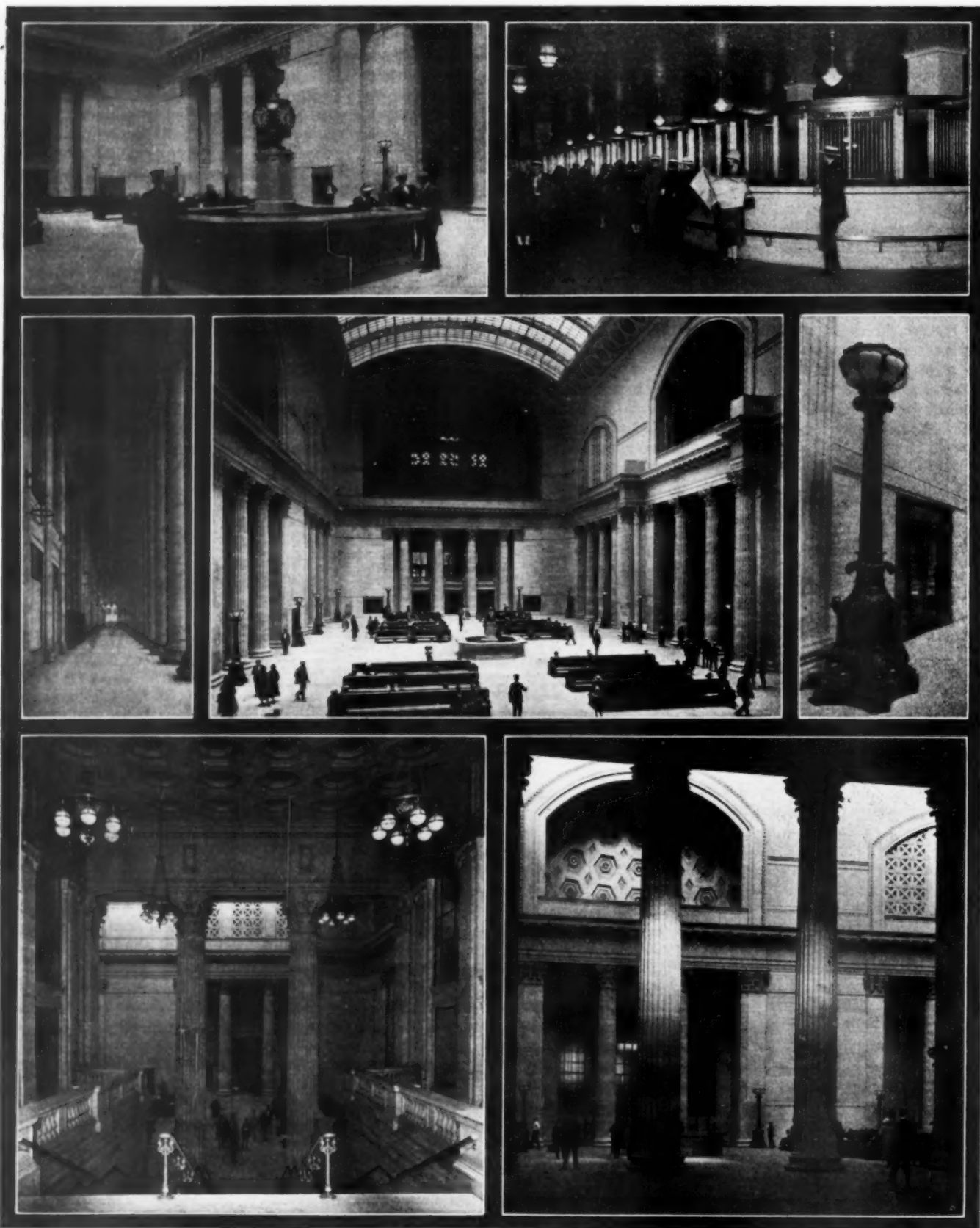
The Headhouse Facilities in Detail

The main waiting room is a plain rectangle in plan with doorways at each end and at three equally spaced intervals on each side to which architectural emphasis has been given by Corinthian columns and pilasters surmounted by an entablature carried around the four walls at a height of 47 ft. above the floor. The clerestory above this entablature is broken up by segmental arch openings forming vertical continuation of the doorways directly below them. The ceiling comprises a flat barrel vault with its crown 112 ft. above the floor. It consists entirely of skylights with the exception of one row of coffers extending around the sides and the ends. The central doorway in the east wall opens into the ticket lobby or main passageway to the passenger concourse and its coffered barrel vault ceiling, extending to a height of 70 ft. is readily discernible through the clerestory opening above the doorway. For the sake of symmetry this coffer treatment is repeated in a half dome niche behind the clerestory opening over the central doorway of the west wall. The other six arch openings in the clerestory serve as windows and are screened by heavy grill work.

The floor of the waiting room is Tennessee marble. The walls to the height of the belt course and the shafts of the columns are of Italian travertine. The remainder of the walls and the ceiling are of plaster, finished in a warm buff tint, in keeping with the soft texture of the

rative treatment of subdued or restful characteristics. The walls have been subjected to but little ornamentation and are broken only by the high window opening on Clinton street and relatively small door openings in the east side. In fact, embellishment has been limited entirely to the ceiling which is coffered with a Pompeian type of decoration in blues, yellows and dark reds, and to two large hangings of Belgian velvet in a deep red which occupy about one-fourth of the upper half of the north and south walls. These are entirely plain save for a small panel into which the official seals of each of the four roads have been tastefully worked. The furniture is American walnut upholstered with blue silk mohair. From the north side of this room a stairway leads to a toilet room in the basement affording both free and pay service. The free toilets provide 21 closets and 11 lavatories and the pay toilets, 9 closets, 18 combination closet-lavatories and four complete bathrooms.

The toilet room for men in the basement of the southwest corner of the building also provides free and pay service. The free toilets contain 38 closets, 18 urinals, 16 lavatories and one Bradley wash fountain. The pay toilets provide 26 closet lavatories, four of which are supplemented by shower baths. All of the toilet rooms have Tennessee marble walls and floors and plastered ceiling. Standard Sanitary Manufacturing Company's fixtures were used throughout. The barber shop, which opens off the stair lobby to the men's toilets, is a room of unusual decorative treatment. The floor is Welsh quarry tile set with wide joints while a high wainscot is finished



The Headhouse Is a Monumental Structure

Upper Left, at the Information Counter; Upper Right, in the Ticket Lobby; Center, the Great Waiting Room; Lower Left, Looking Into the Waiting Room from One of the Canal Street Stair Lobbies; Lower Right, the Ticket Lobby Passage Affords a Broad Entrance Into the Waiting Room

in Faience tile having a buff body and green trim with recesses for toilet cabinets and open shelves. The ceiling and the walls above the wainscot are plastered with a smooth but irregular surface tinted in light cream. Space is provided for 16 barber chairs, with individual pedestal lavatories and mirrors with black frames for each chair.

A Restaurant of Unusual Character

The largest room on the west side of the building is a lunch room 85 ft. by 111 ft., located symmetrically with respect to the east and west side of the building. It has a low American walnut wainscot with a marble base, plastered walls and a coffered ceiling. The entire west side of this room for a width of 22 ft. 8 in. and a height of 13 ft. is occupied by a service kitchen, the remaining floor space being occupied primarily by three U-shaped lunch counters with space adjacent to the north and south walls and on the mezzanine floor above the kitchen occupied by tables. The counter and stools are of table-chair height. The top of the counter is a thick slab of green Vermont marble while the base is of grey travertine on the patrons' side and Tennessee marble on the serving side. The floor on the public side is Tennessee marble, and on the service side it is rubber tile, the service space floor being depressed a sufficient amount below the level

this room is afforded by a corridor from the main waiting room as well as by a short corridor leading to the Clinton street entrance of the south arcade.

This dining room and the lunch room receive direct service from the service kitchen at the rear of the lunchroom, but the main kitchen, bakeries, stores, dishwashing facilities, refrigerators, etc., are in the basement. The basement space assigned to the concessionaire, Fred Harvey, also embodies a large cafeteria, entrance to which is had by a stairway leading from the south lobby of the waiting room. All kitchen space in the basement is finished with red quarry tile floors and white glazed tile walls.

The Ticket Office

The ticket lobby occupies the entire southeast corner of the headhouse east of the main waiting room and south of the ticket lobby passage. Of this space a rectangular area 58 ft. by 100 ft. is occupied by the ticket offices, affording 150 ft. of counter length on two sides with 29 ticket windows. The face of the counter is travertine, the top is Belgian black marble and is surmounted by a brass grill backed with clear glass, thus affording a clear view of the entire interior. There are no fixed ticket cases. Each ticket clerk is assigned an individual case mounted



Looking West in the Passenger Concourse Towards the Three Broad Archways Communicating with the Facilities Under Canal Street

of the public space floor to give the counter a convenient serving height.

To the south of the lunch room is a formal service dining room, 42 ft. 5 in. by 56 ft., which is decorated in a more subdued tone than the other rooms. It has a high wainscot of American walnut divided into small panels to offset the effect of the high ceiling. The walls are plastered and the ceiling is coffered in decorative plaster. Unusual pains have been taken by the concessionaire to give the room a dignified, distinguished air. Unusually rich furnishings have been provided in the form of tables, chairs and sideboards of antique Italian pattern. Access to

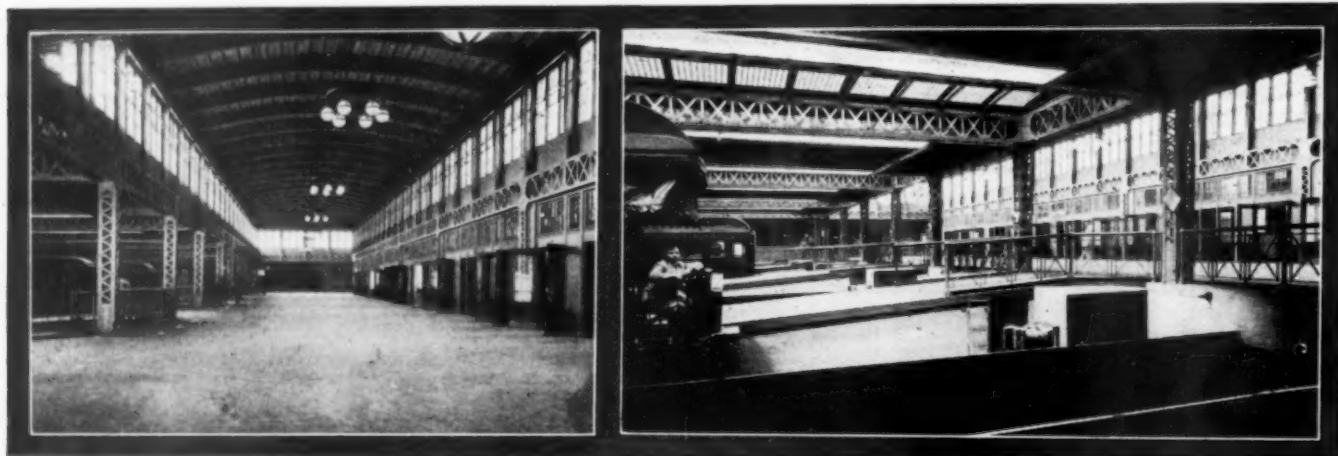
on castors which is rolled into place adjacent to his window when he goes on duty and is locked up and removed to permit its replacement by a case assigned to the clerk who relieves him when his tour of duty is completed. The only segregation of the business done at the various ticket windows is to assign six windows to the sale of commutation and local tickets and assign all the rest of the windows to the sale of both railroad and sleeping car tickets. Each clerk is equipped to sell tickets for all roads using the station, his ticket case being stocked with tickets covering 95 per cent of the routes called for in the normal ticket sales. Tickets covering the remaining routes are

kept in a special case placed in the center of the ticket office where they are available to all clerks. The clerks are provided with telephones for communication with the reservation bureau on the third floor where clerks in the employ of the four railroads record reservations on the car diagrams. A few minutes before train leaving time, the diagrams are transmitted by pneumatic tube to the passenger agents of the individual railroads who occupy offices at the south end of the concourse lobby, whence they are delivered to the Pullman conductors.

Space is also provided on the third floor for an information bureau. In this room 20 trunk lines from a Chicago telephone exchange are carried to 12 operator positions, 6 on each side of a long table, divided lengthwise by a rack equipped with time tables and rate sheets for ready

has been provided. The walls for the most part are grey mottled terra cotta with some of the upper portions of plaster finished in imitation of stone. The windows have steel frames and sash.

The floor is of reinforced concrete with large areas of vault lights for the purpose of affording some natural light to the baggage room in the basement. The floor of the concourse is entirely unoccupied except for an information counter of terra cotta in the center, over which is mounted a train bulletin divided into panels assigned to the various railroads. This bulletin board is surmounted by a two-face clock. At the east end of the building, flanking the stairway are two low projections from the east wall, the lower portions of which are devoted to concession space occupied by Fred Harvey as a grill room, a



The South Train Concourse. Passenger Platforms Are Connected to the Train Concourse Floor by Means of Ramps. Enclosure for One of the Baggage Platform Ramps in Foreground

reference. Each operator can handle a call coming in on any trunk by moving the proper keys.

The concourse lobby under Canal street has a Terrazzo floor, terra cotta walls and a flat groined ceiling finished in light grey. The baggage and parcel counters are constructed of laminated maple and steel plates with vertical sliding windows of rough wire glass set in steel frames.

A Spacious Concourse

The interior of the passenger concourse is of a design somewhat similar to the concourse of the Pennsylvania station in New York, except that opportunities were afforded for a greater refinement of detail in the Chicago station. The roof consists of five flat barrel vaults with their axes east and west and is supported by steel arches carried on steel columns, all of the steel work being entirely exposed. The framing of the main central portion of the structure is divided into three longitudinal aisles with a central span of 84 ft. and two side spans of 20 ft., the ceiling at the crown of the central span being 90 ft. above the floor and that of the two side spans somewhat lower. Flanking this central portion are two side aisles of 68 ft. span with ceilings 43 ft. above the floor. In the transverse direction the ceiling is divided into bays 34 ft. wide which are spanned by longitudinal arches. The arches are all open box trusses and the columns comprise four angles laced on the inside, the framing being done in an unusually finished manner, especially at the junction of the four arch trusses at the tops of the main columns. The roof is covered for the most part with Federal pre-cast cement tile. In the main center span and in the two low side aisles these tile are exposed on the under side, while in the two 20-ft. aisles a plastered ceiling of flat dome shape

fountain luncheonette and a cigar, magazine and book shop.

Train Gates of Iron and Glass

Access to the train concourses on either side of the passenger concourse is provided by continuous lines of vestibules 7 ft. 3 in. deep with sliding doors on the inside and swinging doors on the track side. These vestibules are arranged in groups serving two tracks for each 34 ft. bay, providing two exits to the trains 4 ft. 8 in. wide next to the columns with an entrance from the trains in the center 12 ft. wide. A "Hutchinson" train indicator for each track separates the entrance and exit doors. The vestibule construction is entirely of iron and steel with glass panels in the doors set in steel frames.

The train concourses, which correspond in detail and construction with the passenger concourse, are entirely open on the track side except for iron railings at the ends of the tracks which are carried partway down the sides of the passenger platform ramps.

The baggage room is 278 ft. wide, north and south, by 258 ft. long. Its width is expanded at the west end to provide a loading platform 400 ft. long abutting on the space for street vehicles. Under the prevailing operating arrangement the bulk of the express is handled in facilities provided by each of the individual railroads, consequently a space 45 ft. by 85 ft., partitioned off at the south end of the loading platforms is adequate for the handling of such express matter as must be loaded or unloaded at the station platform. The baggage room is provided with six Toledo scales, with automatic direct reading dials. Four of these are located along the loading dock (one in the express space) and the two others in the center of the

room. The trucking equipment including that required for handling mail, comprises 7 Elwell Parker burden carrying electric trucks, 12 Mercury and 7 Elwell Parker electric tractors, 300 Mercury castor type trailers, 50 double-end trailers with a tongue at each end and a number of other styles of smaller trailers.

How Baggage Is Handled

A pneumatic tube system comprises an important agency in the operation of the baggage room. This affords direct connection between weighing stations at the loading platform and the exchange cashier's office, which is located in the baggage room directly below the checking counter enclosure on the station floor, between the exchange cashier and the checking counter and between the exchange cashier and the baggage master's clerks' office. Every piece of outbound baggage unloaded at the platform is weighed by a receiving clerk on one of three automatic scales who makes out a weighing slip on which he records the weight and the number and name of the trucking company's check on the trunk. This weight slip is transmitted to the baggage counter for file until the passenger presents his duplicate check. When the duplicate of the trucking company's check is presented at the counter, it is taken up and dispatched to the exchange cashier with the duplicate of the railroad check presented to the passenger for identifying the trunk and attaching the new check.

Hand baggage checked at the counter is passed to the baggage room by means of a chute, while incoming hand baggage is delivered to the counter by an elevator and placed on compartment shelves until called for. The efficiency of this detail of the service is indicated by the fact that cases have been noted where hand baggage has been loaded out of baggage cars, trucked into the baggage room, elevated to the counter enclosure and stored before a passenger could alight from his train and walk the length of the platform and concourse to claim his baggage at the counter.

Well Designed Illumination

While natural lighting has been provided in abundance in the principal rooms of the station, careful study was given to insure that the artificial illumination would be equally effective. The lighting of the main waiting room is unique and embraces two independent systems. The

ceiling and clerestory walls are lighted by two batteries of flood lights installed in balconies at the two ends of the room. Each bank contains thirty-five 500-watt X-ray reflectors and produces a well diffused light. The lower portion of the walls, the columns and cornices of the belt course are effectively lighted by lamps installed on the tops of 16 massive bronze torches or floor standards mounted on green Vermont marble bases and placed at uniform intervals along the walls. The lighting fixture is a glass bowl ribbed with bronze which contains two 250-watt lamps mounted over a mirror reflector with four 100-watt lamps below the reflector to illuminate the sides of the bowl.

The coffered vault of the ticket lobby passage is lighted by twenty-four 250-watt X-ray projectors on top of the cornice along the two sides of the room, while the walls are illuminated by four bronze brackets secured to the walls about 14 ft. above the floor. The dining rooms and the women's rest room are lighted by ceiling fixtures of artistic design, while the concourse lobby is lighted by simple bowls in the center of each panel of the groined ceiling.

In the passenger concourse the lighting fixtures are a simple rugged design in distinct keeping with the open steel work which supports the roof. They consist of 12 opal glass spherical globes suspended from a tubular steel ring supported by chains from the roof trusses, being provided with lowering devices to facilitate cleaning. The passenger platforms are provided with two 500-watt lighting fixtures in each longitudinal panel. As no standard lighting unit was found to give a satisfactory distribution of the light, a special fixture furnished by the A. B. Boetter Manufacturing Company was designed for the installation. It consists of casting of special corrosion resisting metal with a polished interior to serve as a reflector with an acorn shaped rippled glass globe. The baggage platforms are lighted with standard R. L. M. reflectors fitted with clear glass covers.

Street lighting has been provided in the form of 40 ornamental street lighting standards each supporting two G. E. "Novalex" basket type street lighting units with 600 candle power series lamps. The balustrade along the river drive is ornamented with stone pylons each of which is equipped with four 100-candlepower series lamps while the office building entrances on Jackson Boulevard and Adams street are embellished by heavy bronze lighting standards of rugged design.

A New Type of Train Shed

One of the outstanding features in the design of the station is a new type of train shed which represents a development resulting from the unusual conditions imposed by the arrangement of the platforms and a sincere effort to effect an improvement over previous designs. It was desired to provide a low type of shed and because the open umbrella or butterfly sheds do not afford complete protection against rain or snow it was concluded that the shed must be of the enclosed type with smoke slots just clearing the locomotive stacks to obtain an immediate discharge of smoke into the open air. It was also felt desirable to provide more headroom over the passenger platforms than is usually obtained in low sheds. Another controlling consideration in the determination of the design was the width of the baggage platforms which is not sufficient to permit the placing of any columns in them. Consequently, the design had to be one in which the transverse roof span equals the distance between columns placed in the centers of the passenger platforms, or 49 ft. 9 in., a condition that at once introduced a serious problem

to avoid excessively heavy and deep transverse girders to support the roof load.

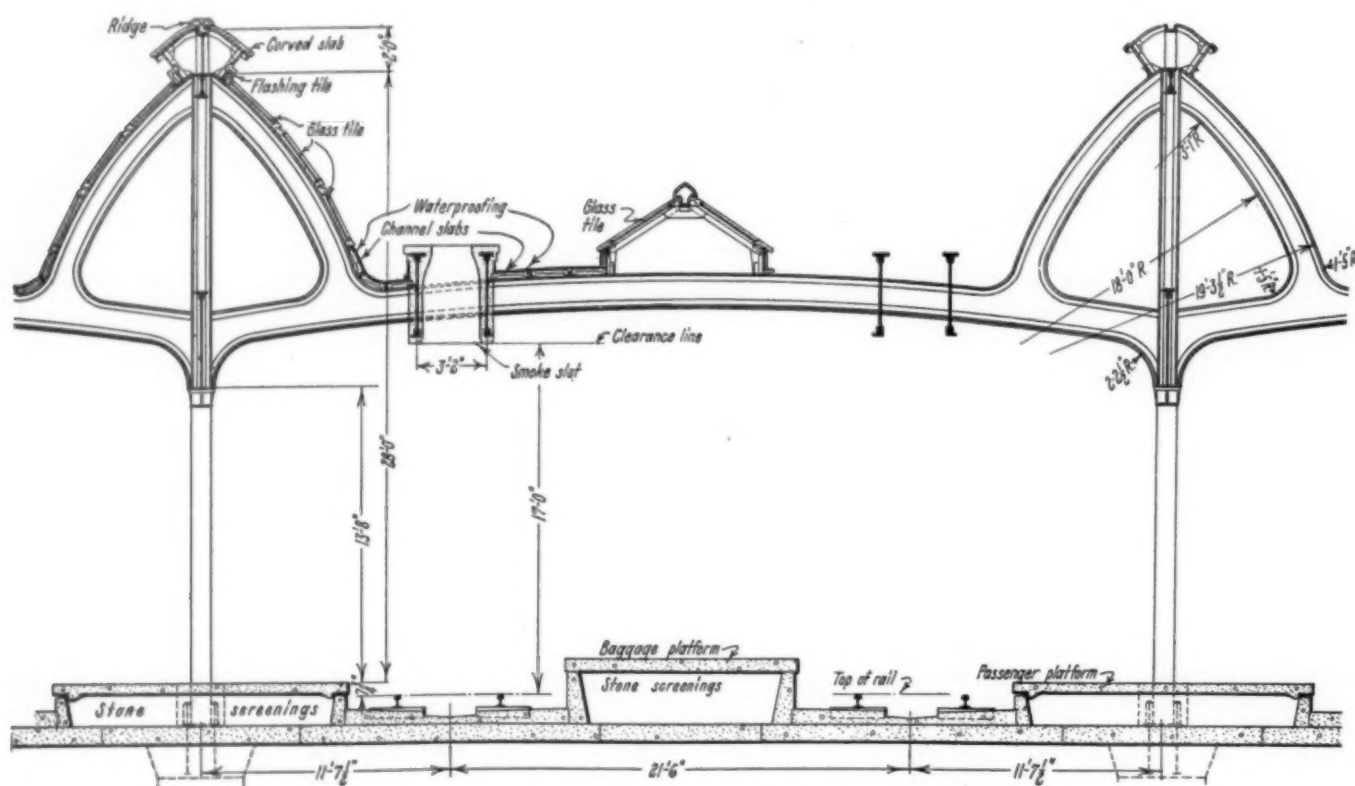
These problems were solved by the development of a design which is not only ingenious from the standpoint of the structural engineer but is also unusually pleasing in appearance. The transverse load-carrying member comprises a flat arch girder affording a clearance of 17 ft. from top of rail, combined with two upward extending legs which are carried to a connection at the column at a height of 28 ft. above the platform. This arrangement provides a heart-shaped truss over each column which performs two important functions. It provides a monitor over the passenger platform affording the desired headroom, more effective lighting and better ventilation, and it effects a marked shortening of the effective span of the transverse girders.

For the purpose of reducing the obstruction in the passenger platform resulting from the presence of the shed columns, they were spaced as far apart as practical considerations would permit, 41 ft. 8 in. center to center.

The load between the transverse frames is carried very largely on the longitudinal girders forming the sides of the smoke slots, but supplemented by arch girders in the planes of the columns which frame into two struts connecting with the tops of the columns to form a ridge pole

being the use of special sections of bulb beams for the curved rafters.

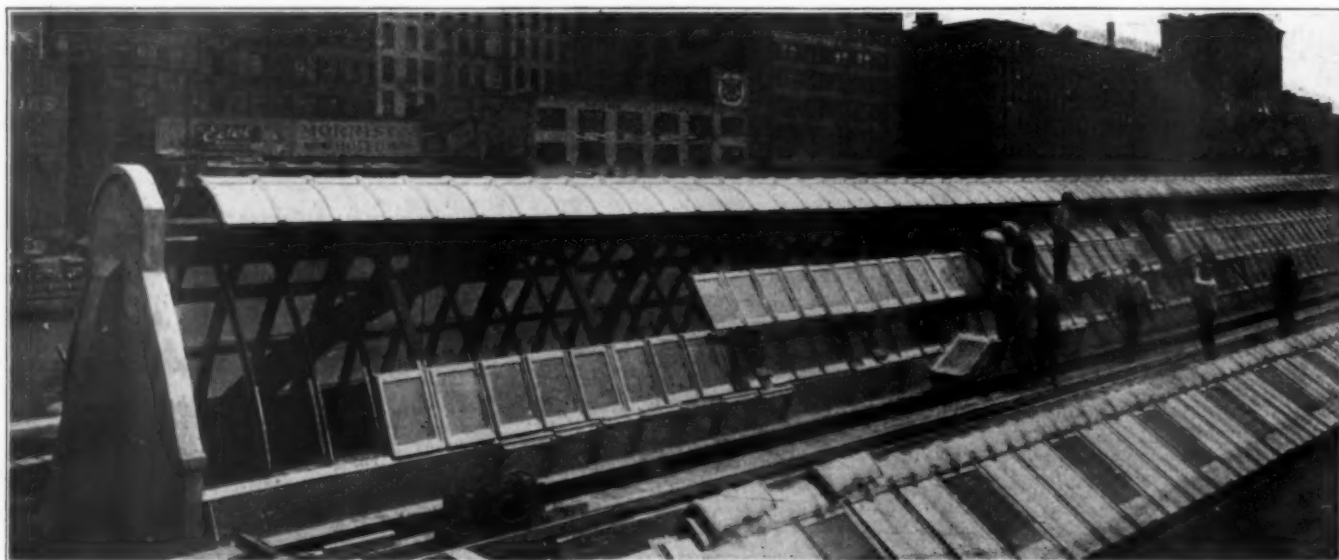
No less distinctive than the outline and framing of the shed is the roof covering which consists of Federal cement tile throughout, for the profile of the roof cross section



A Typical Cross Section of the Train Shed, Station Tracks and Platforms

for the monitors over the passenger platforms. These longitudinal members support five equally spaced rafters conforming to the contour of the roof outline to provide the primary support for the roof covering. Particular

is such as to call for the exercise of ingenuity as well as accurate workmanship to provide precast tile that would insure a perfect fit to the curves and angles of the steel frame. It imposed the necessity of providing 11 varieties



The Concrete Tile and Glass Units Were Made to Fit Accurately to the Steel Frame of the Train Sheds.

commendation must be made of the manner in which the detailing and fabrication of the train shed frames were carried out. The frames have an exceptionally neat, graceful and finished appearance, one means to this end

of tile units for the standard portion of the shed and special units used in the portion of the shed near the outer ends where it conforms to the curves of the converging tracks and where the sheds adjoin the street viaducts.

The top of the high monitor over the passenger platform has a ventilating hood which is covered by two curved slabs $1\frac{1}{4}$ in. thick, 24 in. wide and 36 in. long measured on the curve of this hood, with a special cap unit covering the joint at the ridge. The sides of the monitor for a width of about nine feet serve as continuous skylights and are covered with three tiers of curved glass tile $1\frac{1}{8}$ in. thick, 24 in. wide and 36 in. long, each of which contains a pane of $\frac{1}{4}$ -in. rough wire glass, 20 in. by 30 in.,

Over each baggage platform is a gable type skylight covered with interlocking tile $1\frac{1}{8}$ in. thick, 24 in. wide and 52 in. long on each slope with a standard ridge cap at the ridge. Each third interlocking tile on both slopes is provided with a pane of glass 21 in. by 35 in. The remaining portion of the shed roof, namely, between the baggage platform skylights and the lower edge of the passenger monitor skylights exclusive of the smoke slot is covered with channel-section slabs approximately 18 in. wide by 8 ft. long. In addition to these units flashing tile are provided under the edges of the baggage skylight and under the hood over the passenger monitor.

The channel slabs form gutters which provide the drainage for the roof, emptying into down spouts at the low end of each block. The gutters are provided with

Johns-Manville built-up roofing which is flashed up under the skylight and up the sides of the smoke slots. All the rest of the tile are uncovered, as water proof construction is insured by overlapping horizontal joints and filled vertical joints, together with the density of the concrete in the slabs themselves. The plastic joints are formed by projecting lips on the vertical edges of the slabs, so shaped as to provide a groove which is filled with a special oil-cement filler covered with a weather coating of elastic compound. The glass tiles are of particular interest because the glass is concreted into the slabs in manufacture and is protected against stresses set up by changes in temperature, wind pressure and other strains by dipping the edges of the glass in a hot asphalt preparation before inserting it into the concrete.

Another difficulty imposed in the construction of the train sheds was introduced in the provision for a covering for the girders of the smoke slots to protect them from the corrosive locomotive gasses. Poured-in-place concrete was used for this purpose, the particular problem being to insure a high density in a concrete of such consistency that it would readily flow around the reinforcement and in an exceedingly narrow space between the forms and the sides of the girders. To obtain this the mixture was designed according to the Abrams method.

Tracks Embody Interesting Innovations

The station tracks are all tangent and parallel to Canal street except where they connect with the ladder tracks. The elevation and grades of the tracks were controlled by an established vertical clearance from base of rail to the under side of the viaducts of 17 ft. and the maximum possible elevation of the viaducts over the tracks, as limited by the elevation of the river bridges and Canal street and the maximum permissible grades on the street between these points of fixed elevation and the point of crossing the nearest track. The most severe condition was encountered at Madison street where the controlling condition was the grade of Canal street, which could not be raised materially because of established grades at the station of the Chicago & North Western, which fronts on Madison street between Canal street and Clinton street. This condition resulted in the establishment of elevations for the tracks under Madison street, ranging from minus 2.055 to minus 0.40 for the west and east tracks, respectively. At Van Buren street it was necessary to establish the grade of the tracks at plus 0.73 as fixed by the elevation of the roadway on the Van Buren street bridge. At all other points advantage was taken of the opportunity to establish higher elevations for the tracks in order to obtain more favorable drainage conditions, but this introduced a more or less undulating grade line with grades ranging from 0.0 to 0.4 per cent, except in the sag at Madison street where considerably heavier grades are required for short distances.

New Approaches Afford Greater Capacity

The track approaches to the station have substantially the same locations as the old ones, except that the alignment has been improved. However, primary change was that of providing six tracks in the south approach instead of four, and four tracks in the north approach, used exclusively for passenger service instead of two which in the old layout were used both for passenger trains and for the freight transfer service now handled on two entirely independent tracks. The station company's south approach tracks terminate at Roosevelt road, where they

join with four tracks owned jointly by the Pennsylvania and the Chicago & Alton and two tracks owned by the Burlington, and with passenger coach yards and engine terminals of the Pennsylvania and the Burlington to the east and west of the main tracks, respectively. The north approach terminates in the vicinity of Carroll avenue (vacated) on a curve connecting with a two-track main line owned jointly by the Pennsylvania and the Chicago, Milwaukee & St. Paul, extending to the west, and with a branch line of the Chicago, Milwaukee & St. Paul extending to the north.

In the case of both the north and the south approaches the axis of the approach tracks lies considerably to the east of the axis of the station tracks. Consequently, connection between the approaches and the platform tracks was made in each case by a single pair of ladder tracks fanning to the west. In most cases the platform tracks are arranged in pairs with a single connection to the two ladder tracks, the parent track of each pair crossing the inner ladder to a connection with the outer ladder and thus providing for simultaneous parallel movements in or out of any two of the platform tracks except the two tracks of any one pair. To permit direct connection between any approach track and any station track, double crossovers were provided in both directions at the throat of each yard as well as at the ends of the station company's tracks at Roosevelt road and at Fulton street, the throat at Fulton street being complicated by the fact that it is required to serve the two transfer tracks as well as the station approach tracks.

Heavy Construction

The track construction is designed for heavy service. All track on the approaches and through the crossovers and switches is laid with 130-lb. rail with 100-lb. rail in the tracks paralleling the platforms, all rails being of the P. S. section. The ties are 7 in. by 9 in. by 8 ft. 6 in. of creosoted red oak, placed 20 to the 33-ft. rail with 11-in. by 7-in. by $\frac{3}{4}$ -in. tie plates throughout. Through the diamond crossings the ties are 8 in. by 10 in. by 21 ft.

6 in. In the case of all tracks adjoining station platforms, the rails are supported on blocks, 6 in. by 8 in. by 2 ft. 6 in. long embedded in concrete and leaving a space about 2 ft. 6 in. wide between the inner ends of the two lines of blocks to facilitate drainage and the removal of rubbish. All rail joints are either of the continuous or 100 per cent type. The ballast for the approach tracks is broken stone, having a depth of 6 to 10 in. under the ties as is explained later.

In laying out the turnouts, slips and crossings special pains were taken to avoid special construction as far as possible and to avoid short radius curves, while making every effort to secure the maximum length of platform tracks. With the exception of five No. 7 frogs and two No. 6 frogs all frogs are either No. 8 or No. 9. The design and construction of the slip switches and crossings introduced many serious problems, particularly because of the use of 130-lb. rail and the necessity for providing effective insulation at the many points where this was required. However the construction is of a uniformly high grade and has rendered excellent service under heavy traffic.

Tracks Supported on Concrete Blanket

The most distinctive feature of the track construction is the special foundation provided in the form of a concrete blanket throughout a large part of the terminal area. This construction was applied not only to the station tracks, in which resort was had to the special construction referred to above, but also through most of the standard track construction and all of the turnouts, slips and diamond crossings, for which the concrete blanket or slab construction serves as the base upon which ordinary ballasted track is supported. It was described in detail in an article by J. D'Esposito, in *Railway Engineering and Maintenance* for September, 1923, page 353.

This unusual form of construction was adopted after a study of the unfavorable conditions imposed, which led to the conclusion that track maintenance would be exceedingly expensive and that it would be impossible to maintain the tracks in a satisfactory condition unless a more stable support was secured than that offered by the natural surface of the blue Chicago clay in a location so close to the Chicago river that it was constantly in a state of saturation and with the tracks at an elevation that would make satisfactory drainage impossible.

Covers Large Area

The total area of the concrete slab construction is 1,125,000 sq. ft., or approximately 25.6 acres. This area embraces all of the tracks from the north limits of the terminal property to Polk street and throughout the limits of the double crossovers between Taylor street and Roosevelt road. In addition the slabs were provided to support the two joint transfer tracks from the north end to Harrison street.

This construction consists throughout of 10-in. slabs of concrete reinforced in both faces with wire mesh or bars and divided in units of convenient size for construction. All of the slab construction was laid on a bed of 6 in. of cinders. Where the tracks are ballasted the slabs are generally 13 ft. wide, corresponding to the track spacing, and 21 ft. long. Under the platform tracks they are 14 ft. wide with a slab of plain concrete under the platform to fill out the space between adjoining track slabs. Superimposed on these platform track slabs is a second concrete slab of irregular section designed to hold and support the short blocks which carry the rails while along either side is a curb wall to retain a fill of fine stone screenings which supports the slabs providing the surface for the platforms.

Difficult Drainage Problem

With a construction such as this, drainage is a matter of prime importance and entails special measures in that portion of the area between the north end of the terminal and Harrison street, where the track level was so low as to preclude gravity outflow into the city sewers. Throughout the length of the station platform the tracks are on a sufficient grade to insure adequate flow to catch basins, but under the approach tracks it was necessary to slope the slabs independently of the track grade so that the depth of ballast varies from 6 in. at the ridges to 10 in. in the valleys. The drainage system consists of a series of lateral or cross-drains of 8-in. cast iron pipe spaced approximately 80 ft. center to center with catch basins between the tracks in the ballasted construction and in the trough or center line gutters of the platform tracks. These cross-drains discharge into 12-in. cast iron longitudinal drains which, in the case of the area south of Harrison street, empty directly into the city sewers. North of Harrison street the mains discharge into two sumps, one



The Train Shed Is of a Design Which Affords Ample Light and Air Over the Passenger Platforms

just south of Van Buren street near the mail building, and the other at Madison street, from which the water is pumped into the river by means of two automatic centrifugal type bilge pumps. These two pumps are also connected by a by-pass with an independent drainage system for the down-spouts of the train sheds, which discharges directly to the river, the only function of the sump connection being to insure that the train shed drainage system is thoroughly drained after each rainfall.

Results Justify Added Expense

A considerable portion of the track support has been in service for five years and the experience with it has fully justified the added expense for this construction. An unusual opportunity for a study of the results is af-

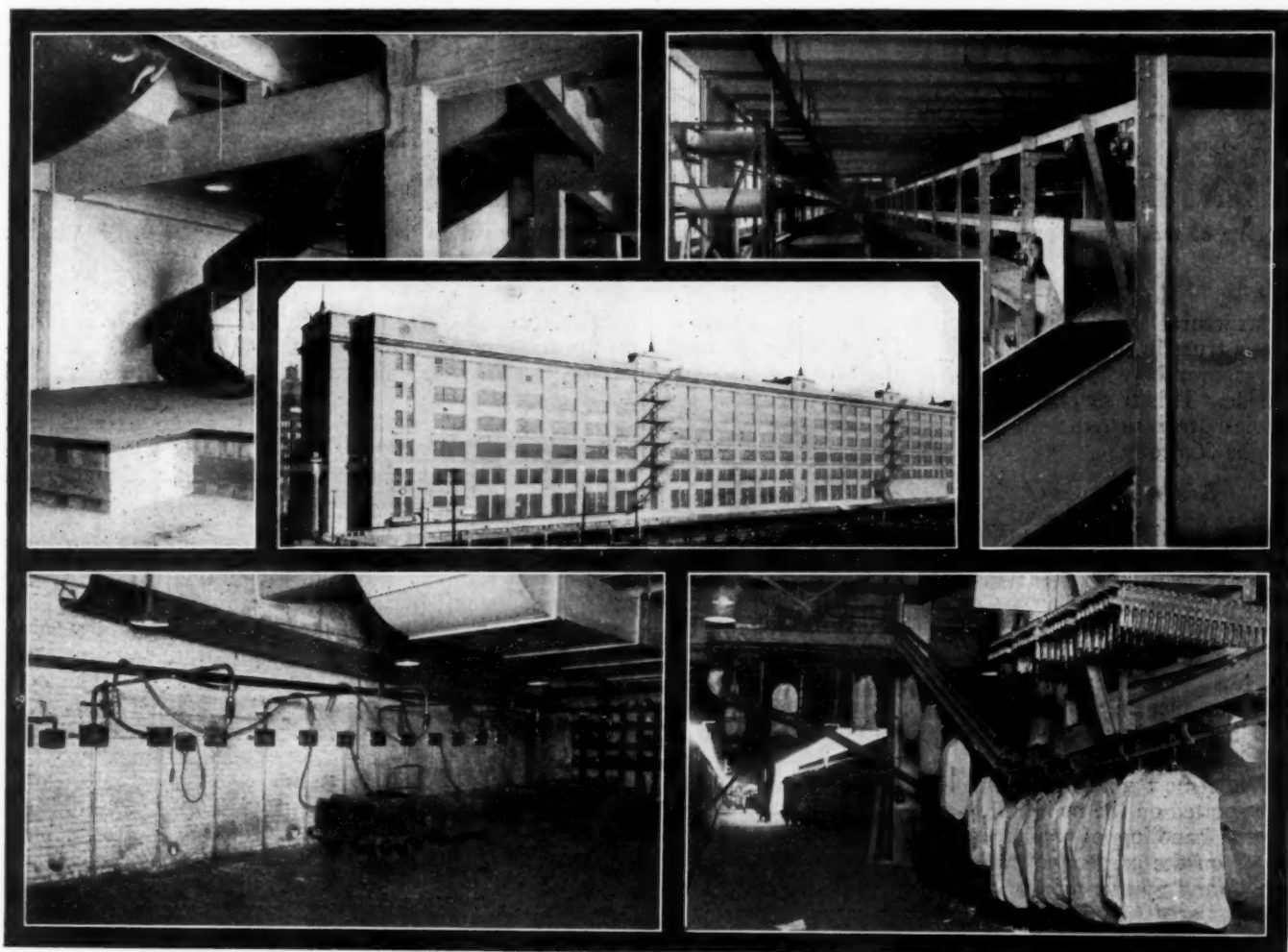
forded by the fact that a portion of the tracks, namely, those between Polk street and Taylor street, which are supported directly on the natural foundation, were placed in service at about the same time. This stretch of track, which contains almost no frogs or switches, has required

maintenance expenditures fully four times as great as that which has been necessary on the tracks in the block between Polk and Harrison street, which is supported on the slab construction and which embraces a large number of slip switches and four diamond crossings.

An Innovation in Mail Terminals*

With its development and construction period coincident with the decade during which the greatest impetus was given to the parcel post service, it became apparent early in the course of the project that the station facilities must include provision for the handling of mail far in excess of anything that had ever been considered necessary in the design of any other passenger station. Studies of the requirements made by the rail-

but which could be utilized in large part for a variety of postal operations definitely under the control of the postal department. In December, 1920, an agreement was drawn between the railway mail service and the Chicago Union Station Company under which the station company agreed to construct a large building comprising seven stories and a basement and to lease the upper six floors to the federal government, the track level and the basement to be re-



Five Views of the Railway Mail Terminal

Upper Left, the Spiral Chutes; Upper Right, One of the Felt Conveyor Separating Units; Lower Left, the Battery Charging Station for Electric Trucks; Lower Right, the Trolley Conveyor System for Delivering Mail Sacks to Cars

roads and also by a committee representing the railway mail service led to the conclusion that the situation called for the development of a plant isolated as far as possible from the other station facilities and which would not only afford adequate capacity for the conduct of that portion of the mail handling which falls directly on the railways

tained for its own use. Detailed plans were then prepared and contracts awarded and the building was placed in operation in December 1922.

Is of Unusual Size

The building is located just east of the station tracks of the south group and extends from Van Buren street to Harrison street. It is 796 ft. long and 75½ ft. wide,

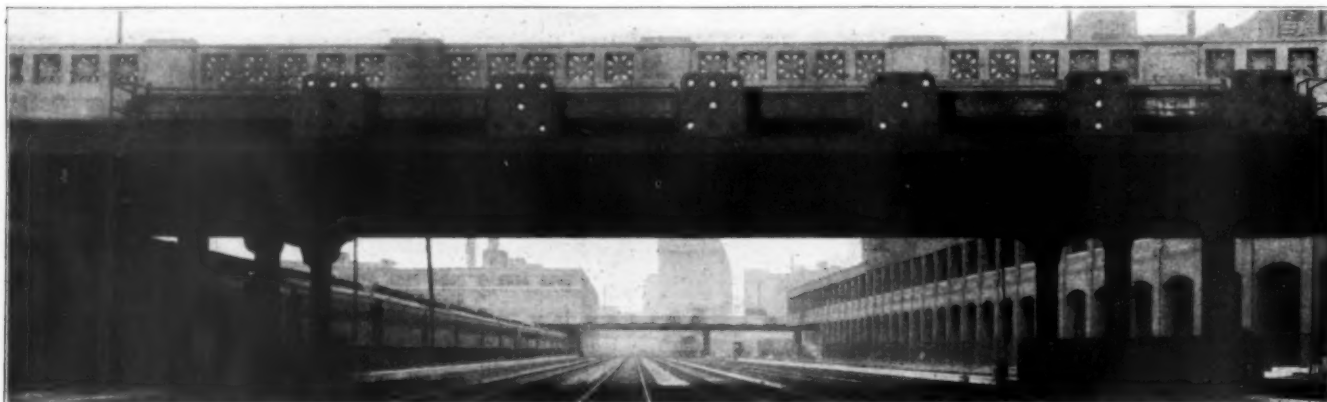
* A more complete description of the mail terminal appeared in the *Railway Age* of March 4, 1922, page 513.

contains 11 acres of floor area, has a cubical contents of 8,500,000 cu. ft. and is designed to handle 3,000 tons of mail matter each 24 hours. It is served on the second or street level floor by a driveway 33 ft. wide extending the full length of the building along its east side which affords 580 ft. of free tailboard space or enough to serve 63 vehicles at one time. Platforms serving the five tracks provided exclusively for mail service and the easterly passenger tracks have a length sufficiently adequate to accommodate 43 cars.

The building has a steel frame containing 7,000 tons

cars and vice versa. However, the great bulk of the operations of the terminal consists of the receipt, classification and dispatch of all papers, catalogs and parcel post mail originating in Chicago, as well as mail of these three classes passing through the city.

All classes of mail made up in bags for mail cars on lines served by the union station are received on the street level at the north end of the building where 18 chutes are available for transmitting the sacks direct to the track or basement level to be sorted and loaded on platform trucks for hauling to mail cars and to various trains. In-



A View of the South Approach Tracks Showing Position Light Signals Mounted on the Fascia of the Taylor Street Viaduct. Pennsylvania Freighthouse in the Right Background

of structural steel, the most notable feature of which is a steel truss in the west wall 149 ft. 4½ in. long spanning a crossover between a track inside the building and one outside. This truss carries a load of 4,050 tons and is the heaviest truss ever used in building construction. It weighs 365 tons.

Adopt Details of an Industrial Structure

The building has brick walls faced with cream colored brick and reinforced concrete floors provided with a wearing surface of creosoted blocks. On the track level the building is open to the weather on the ends and along the west side. On the street level the open space along the delivery platform is provided with rolling doors. The windows afford large glass areas set in steel sash. The main entrance on Van Buren street and the minor entrance on Harrison street, as well as the cornices, belt courses, etc., have been finished in Indiana limestone.

While most mail handled is loaded and unloaded from cars spotted on the mail building tracks, provision is made for the handling of mail to and from cars and trains at points on the passenger tracks by means of trucks which deliver and receive mail in the basement, whence they are afforded access to the baggage platforms on the north and south passenger tracks by a tunnel extending from the mail building to the baggage room and thence via any one of the baggage platform ramps to the mail cars. More direct access to the south ends of the south station tracks is afforded by means of a tunnel leading west from the mail building to the power house, from which elevators communicate with the platform level.

Serves Many Purposes

This terminal has a variety of functions. From the standpoint of railway officers the feature of first interest is the handling of mail received from and delivered to trains at the union station. This portion of the work is handled by union station employees and consists primarily of the transfer of mail sacks from street vehicles to mail

coming mail on trains entering the union station is sorted on the track or basement levels, loaded on trucks and delivered to the upper floors of the building by any one of 15 Otis freight elevators. Sacks of mail properly sorted for other railway stations or for Chicago city delivery are delivered to the street level floor and trucked to the driveway space near the south end of the building for transfer to street vehicles.

Elaborate Mechanical Installation

The mail terminal owes its greatest distinction to the enormous amount of mechanical equipment provided for the various operations of transporting, elevating, separating and chuting of mail matter in the operation of the plant under the direction of the postal service. This consists in large part of a system of 65 conveyor belts operated by independent electric motors and entailing the use of seven miles of belting. This equipment was designed and installed by the Lamson Company. It includes also five spiral chutes built by the Samuel Olson Company which delivered mail sacks either to the street level, the track level or the basement. One unique development in this connection is an overhead trolley conveyor system for the delivery of mail at the track level from the ends of the spiral chutes into the mail cars spotted along the various platforms. This consists of an overhead rail made of a cold rolled steel bar 1½ in. by ½ in. in section, supported from the canopy over the platform and extending to the handling platform located at the base of the spiral chutes.

This rail serves as a runway for a trolley which consists of a small bronze casting equipped at its upper end with a trolley wheel and at its lower end with a hook from which the mail sacks are hung by the tying cord. This hook is mounted on a pin so that it may be tripped to release the sack whenever a projecting finger on the side of the trolley frame meets with an obstruction in the course of its travel along the rail. This obstruction is introduced in the form of a portable tripping device

which can be mounted on the trolley rail at any point in its length. This system, which was developed by the Allbright-Nell Company of Chicago, has effected a marked

saving in labor since it does away with the loading of trucks at the chute, transporting them to the mail cars and unloading at the cars.

Interlocking System Embraces New Features

The signaling and interlocking system for the operation of trains is divided into two parts, one controlling the station and approach tracks at the north end, the other governing those at the south end. As explained previously, the switches in both the north and the south tracks are arranged in two distinct groups, one group embodying the ladders and crossovers at the entrance to the trainshed and the other embracing the crossovers at the ends of the station company's property.

The operation of the station requires that all passenger trains must be handled twice; outbound trains must first be backed in from the coach yards and incoming trains must be backed out after delivering passengers. This routine requires a close co-ordination in the operation of the two groups of switches to give a smooth and complete movement between the station and coach yards and at the same time retain clear tracks for the movement of outbound and inbound trains. Careful consideration of this operating feature led to the adoption of one central point at each end of the station for the control of all switches and signals.

Extent of the Requirements

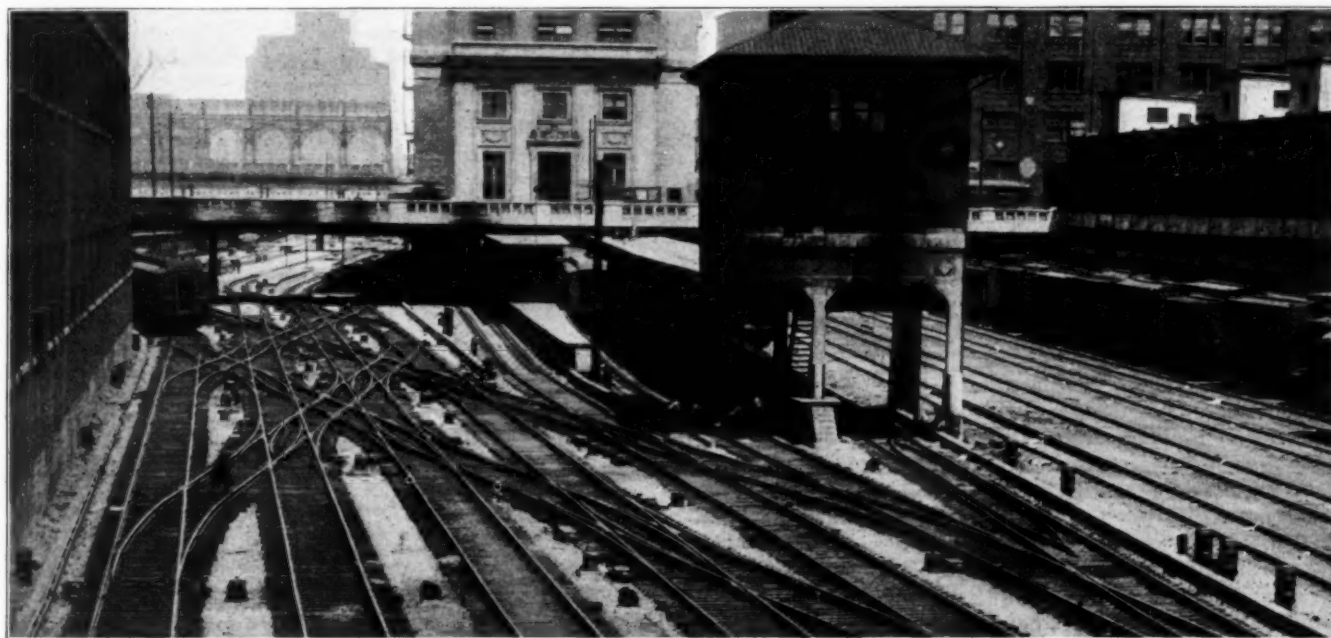
The plant governing traffic at the south end controls 36 high signals, 70 dwarf signals, 38 movable point frogs,

Switch & Signal Company. Electric power for the operation of the plant is supplied from the Union Station company's sub-station as 2300-volt current is distributed to the interlocking system over two power lines each having its own transformers where the voltage is changed to 110 volts to serve the interlocking system. Compressed air at 70 lb. pressure is furnished by the Union Station company's power plant.

The Interlocking Towers

The interlocking towers are of reinforced concrete and steel construction with brick facing and tile roofs. The south tower is located just south of the railway mail building on columns set astride of one of the east stub tracks serving the mail terminal. The north tower is located east of the tracks a short distance north of Lake street. These towers are two stories high with relay motor generators and storage batteries on the lower floor and a Union Switch & Signal Company's Model 14 electro-pneumatic type interlocking machine on the upper floor. Each machine is equipped with two rows of lever lights which are used for providing a visual indication as to the condition of the section locking for the switches and the position of the signals.

The track models are of the illuminated spot-light type.



Looking North at the Throat of the South Station Tracks. Signal Tower in the Right Foreground, Railway Mail Terminal Building in the Center Background.

76 double slip ends and 42 single switches covering a length of 4,800 ft. The plant governing the traffic at the north end controls 2 high signals, 57 dwarf signals, 15 movable point frogs, 30 double slip ends and 41 single switches covering a length of 3,200 ft. Concentrating the control at one point eliminates the exchange of information necessary to co-ordinate train movements.

The interlocking plants are of the electro-pneumatic type with position light signals furnished by the Union

The south plant model has 194 spot-lights for track circuits, 2 for traffic direction between plants and 28 for train starting, a total of 224 spot-lights. The north plant model has 87 spot-lights for track circuits, 2 for traffic direction lights between plants and 20 for train starting, a total of 109 spot-lights. Spot-lights, placed as near the middle of each track circuit as possible, show a green light when the track circuit is clear and no light when the circuit is occupied. The lights for traffic direction also

show an arrow pointing to the direction in which the traffic is set up.

Auxiliary Equipment

Multiple unit-type tower instrument cabinets of steel construction with glass doors are placed back to back in rows at right angles to the interlocking machine, on the floor below. The switchboard, motor-generators and storage battery are all housed in the same room. Iron-clad Exide storage batteries of 500 ampere-hour capacity, consisting of two sets of 14 volts each, assembled in sets of 3 and 4 cells are mounted on a concrete platform 6 in. above the floor. These storage batteries are used to control the switch valve magnets, switch indications, signal control and route locking relays. The motor-generators and switchboard are of the General Electric Company's make, there being one motor generator for each set of batteries.

Switch movements are Union Switch & Signal Company's electro-pneumatic Type-AI. All of these switch movements are equipped with U. S. & S. separately mounted Style-C cut-off type valves to effect economy in air consumption.

New Design of Position Light Signals

Position light signals were adopted and a special design for the high light signals of a new type was developed after a careful study of the conditions imposed by the necessity for placing them on the fascias of the street viaducts crossing the tracks. Special pains have been taken to give these viaducts an attractive design and avoid the introduction of any features projecting above the top of an ornamental railing of uniform height. Consequently, it was highly desirable to develop a type of signals that could be supported against the outside of these railings without projecting above their tops. It was also desirable to provide signals for these tracks affording five indications, a requirement that would have required three arms in a semaphore type of signal, two units in a standard position light signal and three units in a color light signal.

The position light signal, as developed for the high signals, gives five aspects in a single unit. It consists of two horizontal rows of three lights each with a single light placed in the center and half-way between the two horizontal rows.

Dwarf Signals Give Four Indications

The dwarf signal is a standard position light dwarf signal with four lights that afford four indications. The significance of these aspects is explained in the diagram. The addition of the fourth indication to the dwarf signal is a new development in signaling and makes the dwarf signal particularly suited for signaling a busy terminal to allow trains to occupy tracks to full capacity and the addition of the fourth indication allows the connecting of the dwarf signals into a complete signal system, giving complete information for the governing of traffic at the maximum speed at which it is desired to operate in the terminal territory.

The dwarf signal at *clear* indicates that the next signal is at clear or caution. The dwarf signal at *caution* indicates that the next signal is at stop but the track is unoccupied to the next signal. The dwarf signal at *permissive* indicates that the track is occupied immediately ahead and that the movement should be made with caution, prepared to stop short of a train or obstruction. The dwarf signal at *stop* indicates that the route is not set. Use is made of the permissive signal in governing movements to stub end mail tracks and coal tracks at the power house.

How Trains are Started

The system of intercommunication between conductors, gatemen and interlocking operators employs three-indication colored-light signals located adjacent to the station concourse, with one signal for each station track, two indication spot-lights at the entrance gate for each track and two-indication spot-lights on the illuminated track model in the interlocking tower. Push button control switches are spaced approximately every 250 ft. on the train shed columns in the passenger platforms for the use of trainmen. The push buttons for gatemen are placed at the gates directly beneath the

HIGH SIGNAL	DWARF SIGNAL	NAME	INDICATION
		STOP SIGNAL	STOP
		CAUTION SIGNAL	APPROACH NEXT SIGNAL PREPARED TO STOP
		CLEAR SIGNAL	PROCEED AT AUTHORIZED SPEED
		PERMISSIVE SIGNAL	PROCEED WITH CAUTION PREPARED TO STOP SHORT OF TRAIN OR OBSTRUCTION
		SLOW SPEED SIGNAL	TRACK IS SET TO DIVERGE OVER SLOW SPEED TURNOUT TRACK IS UNOCCUPIED TO NEXT SIGNAL OR TO END OF INTERLOCKING LIMITS PROCEED AT SLOW SPEED PREPARED TO STOP AT NEXT SIGNAL OR AT END OF INTERLOCKING LIMITS

Diagram Showing the Indications Afforded by the High and Dwarf Signals.

spot-lights. The push buttons for tower operators are placed on the operator's desk in the interlocking tower. The manner of operation of the train starting system is as follows:

First—The conductor pushes the button nearest to his location on the platform, lighting the red spot-light on the illuminated track diagram in the interlocking tower which is placed at the end of the track corresponding to the track from which the train is leaving and if the information is received at the tower the red light is lighted in the color light signal suspended in the train shed adjacent to the station, the concourse and beside the track from which the train is leaving.

Second—If the tower operator is prepared to handle the train he pushes the button on the operator's desk, thus changing the color light signal near the concourse to yellow, changing the light on the illuminated track diagram to yellow and lighting the yellow spot-light at the gate.

Third—The gateman, after closing the gate, immediately pushes his button at the gate, changing the color light signal to green and the spot-light at the gate to green, thus permitting the train to leave, providing the proper indication of interlocking signals has been received.

Fourth—The train, immediately upon accepting the first interlocking signal, automatically puts out all train-starting lights.

Power Facilities Amply Provided For

The mechanical facilities in an establishment as large as the Chicago Union Station are necessarily of considerable magnitude and of a highly diversified character. The heating requirements are large and are complicated by the especial importance of thorough ventilation, particularly in the basements of both the station building and the mail building and in the office space of the headhouse to the level of the top of the waiting room, where effective window ventilation was not readily obtainable. Ventilation is also of great importance because of the fact that the extensive system of driveways under the headhouse is constantly being used by motor vehicles.

The heating system in the station proper, which is primarily one of direct radiation, is supplemented in large part by a tempering of the large volume of air driven through the ventilating system. The radiators are placed at points of exposure such as the vestibules of the various entrances, exposed outside walls and the skylights, where they serve the secondary purpose of preventing condensation on the glass.

A Million Cubic Feet of Air Per Minute

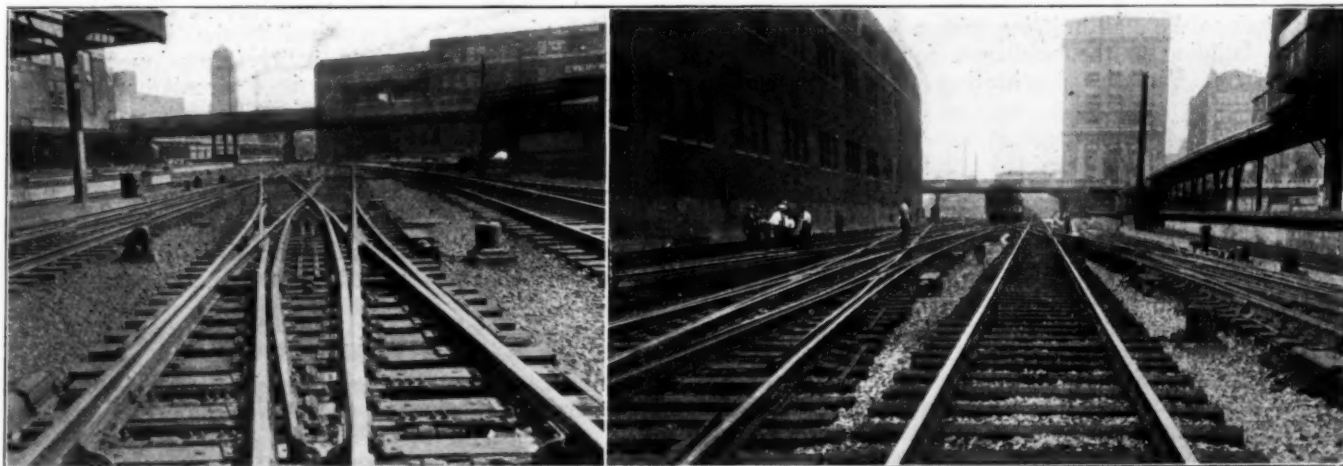
An idea of the magnitude of the ventilating system is afforded by the fact that the complete fan installation has an aggregate capacity of 1,220,000 cu. ft. of air per min. There are 35 fans in the station proper and 5 in the mail building, the largest of which has a capacity of 67,000 cu. ft. of air per min. In addition, 11 fans have been provided for exhausting smoke under the viaducts at Jackson boulevard and Adams street. The ventilation in the station structure embraces both plenum and exhaust systems. Fans in the basement take air from large shafts opening into the court above the waiting room and distribute it through a great network of ducts to the various rooms. A second set of fans in

and soap powder after which they are re-oiled and replaced. Each fan is equipped with Vento heaters regulated by the Johnson Service Company's thermostatic control system.

Hot Water Heat in Mail Building

The heating in the mail building is of a different character except for the basement which is heated and ventilated by tempered air in the same manner as in the main station. The upper six floors are heated by forced circulation hot water, this system being selected because of the fact that most of the street floor of the building is open to the air and unheated, which would have seriously complicated the return of the condensate from a steam heating system because of the danger of freezing. The water for this heating system is heated in Sims heaters and circulated by two American Steam Pump Company's centrifugal pumps driven by Terry steam turbines. Sims heaters are also used for heating domestic hot water supply in both the mail building and the headhouse.

Other equipment in the headhouse includes two American Carbonic refrigerator compressors with a capacity of 70 tons of ice per 24 hours for the restaurant service and one compressor of the same make having a capacity of 20 tons of ice for drinking water service. There are also three Worthington house pumps each with a capacity of 10,000 gal. per hour for building water supply; four International filters of the same unit capacity for filtering all water used in the building; a Dayton-Dowd motor-driven centrifugal fire pump with a capacity of 1500-gal. per min.; four Nash duplex centrifugal motor-driven pumps for the return of steam condensate to the power house; two 500-gal. Shone pneumatic sewage ejectors and two dry basin type centrifugal bilge pumps



Some of the Slip Switches Have Been in Service for Five Years and Have Rendered Excellent Service

pent houses on the roof of the headhouse exhaust air from the building.

All fans except those for exhausting smoke, were supplied by the Sturtevant Company. Those in the headhouse and concourse are driven by Westinghouse motors through Link Belt silent chain drives. Those in the mail building are direct driven by General Electric motors. All air passing through the plenum system is filtered by Reed air filters which comprise grids of galvanized metal frames 18 in. square enclosing mats of oil soaked steel wool. These filter units are readily removable for the purpose of washing them with water

furnished by the Yeomans Brothers Company. Equipment of a substantially similar character is also provided in the mail building.

Power Plant for Heat Only

The supply of the energy required in the terminal, not only in the form of steam for heating but also the power for the operation of the pumps, fans, compressors, etc., is large and imposed an important problem with respect to the power supply, no small portion of which concerns the electric current for the lights, signals and the operation of the mechanical equipment. A careful in-

vestigation by the station company led to the conclusion that the greatest economy and reliability of service would be afforded by the purchase of electrical power from the local public utility, the Commonwealth Edison Company, rather than to construct and operate its own central station plant. Consequently the power plant provided by the station company is designed solely to provide steam for heating the various buildings, to supply hot water for domestic use, steam heat supplies for cars and for the operation of air compressors to supply compressed air for the operation of the switches in the interlocking system and for the charging of trains.

The steam plant is located on a small triangle of land fronting on Canal street a short distance north of Harrison street. It has a steel frame with brick walls and a radial brick chimney 227 ft. high by 12 ft. inside diameter supported on girders forming a part of the roof frame. The plant contains six Babcock & Wilcox, Stirling type water-tube boilers of which four are 610 hp. and two are 328 hp. rated capacity each. They are fired by Green chain grate stokers. Coal and ashes are handled with equipment furnished by the Webster Manufacturing Co.

Engine Room Equipment

The engine room contains two Manistee rotary boiler feed pumps operated by Terry steam turbines; two Bury steam-operated air compressors with a capacity of 500 cu. ft. of free air per min. equipped with Reed air filters; two small Worthington pumps, one for boiler feed during periods of small steam demand and another for boiler washing, and a Warren Webster open type feed water heater.

The steam delivery service is provided by two lines of 10-in. pipe and a 6-in. condensate return extending from the boiler house through the tunnels and basement of the mail building and concourse to the basement of the headhouse, one of the 10-in. lines being provided purely for reserve. In addition an 8-in. line is carried from the boiler plant to the mail building with a 4-in. branch from the mail building to the headhouse for summertime low load service. Facilities for heating cars at the station

tracks is afforded by steam lines along the ends of the tracks with outlets equipped with Barco flexible metallic couplings.

Electric power is supplied by the Commonwealth Edison Company at a sub-station in the sub-basement of the headhouse and another in the basement of the mail building, as three-phase, 60-cycle, 12,000-volt current. In the headhouse sub-station the current is brought in over three independent cables to insure continuity of service. This sub-station is provided with all necessary equipment for transforming and converting the current supplied to 115-230-volt alternating current for station and office lighting, 230-volt direct current for power uses and 2,300-volt alternating current for the train shed and street lighting and for the interlocking plants as previously described. The transformers and converters were supplied by Allis-Chalmers. The station has a capacity of 3,900 kw. with provision for increasing it to 4,900 kw.

The sub-station also contains two special Allis-Chalmers motor-generator sets for applying direct current at either 70 or 90 volts for train lighting and train battery charging. The current for this purpose is conducted to receptacles on each pumping post at the ends of the station tracks and is regulated by Allen Bradley rheostats.

The sub-station in the mail building has a capacity of 1,100 kw. and is similarly equipped. The general power service throughout the mail terminal is 230-volt direct current and in the power plant it is 440-volt alternating current. Charging equipment for the storage batteries of the trucks and tractors used in mail and baggage handling is located adjacent to the mail terminal sub-station.

A study of the speed requirements of the motors required for the various applications, such as the ventilating fans, pumps, refrigerating machinery, conveyors, elevators, etc., was responsible for the adoption of the direct current system. With few exceptions all motors in the main station are Westinghouse Type S. K. while those in the mail building are General Electric. The control equipment was furnished by the Sundh Electric Company and each control panel is equipped with a Urelite enclosed externally operated circuit breaker.

Problems of the Construction Program

The period of nearly 11 years which has elapsed between the completion of negotiations with the city in September, 1914, and the opening of the station appears longer than necessary to complete a project of this kind, but there are many reasons why the work could not be carried out in less time. As seen on the map of the old terminal layout, the site was hemmed in on the east and south by freight stations which could not be abandoned and razed until new freight terminals could be completed to replace them. Moreover, the acquisition of the property occupied by the station, as well as the purchase of sites for the new freight station facilities by the various railroads, involved protracted negotiations and it was not until 1916 that these had been carried to a stage that permitted of active prosecution of the construction work. Furthermore, there was much construction of a preliminary nature that had to precede work on the actual station facilities. Under the contract ordinance with the city new sewers had to be built, viaducts had to be reconstructed to accommodate new track grades and a wall had to be built along the river front. In addition, the approach to a street car tunnel under the Chicago river had to be lowered to accommodate the lower elevation of the tracks and buildings had to be

wrecked and removed from the site of the headhouse and large areas to be occupied by the station tracks and approaches.

The Freight Stations

The construction of new freight terminals for the Pennsylvania, Burlington and Alton comprised projects of large magnitude in themselves. The first of these to be completed and largest was that of the Pennsylvania and embodies a freight station 745 ft. by 420 ft. in plan five stories high extending from Polk street to Taylor street on the east side of the Union Station tracks. It is supplemented by a team yard between Taylor street and Roosevelt road which is now under construction. The Alton terminal occupies an irregular shaped area north of the Pennsylvania terminal with a freight house fronting on both sides of Harrison street.

The Burlington's new local freight facilities occupy all available space between the station tracks and Canal street from Harrison street to Roosevelt road as well as the track level space under Canal street within those limits. The new freight house occupies the space between Harrison street and Polk street with two small extensions south of Polk street, the remaining area being occupied

by team tracks. All of these freight stations are of the two-level type with tracks on the lower level and drive-ways on the upper level.

As the new Burlington freight house was built on ground largely occupied by old facilities, this road constructed a temporary station south of Taylor street which was used while the old houses were removed and the new one was built. But in the case of the Alton and the Pennsylvania the old stations were kept in service until the new facilities were ready for service.

Other Obstacles Encountered

Other conditions which arose during the course of the work were responsible for a large part of the delays. President Wilson's proclamation urging the cessation of all work unnecessary for the winning of the war led to a curtailment of activities in 1917 and a virtual cessation of operations from July, 1918, to the spring of 1919, but labor troubles caused the most serious obstruction to the conduct of the work. Strikes on the Pennsylvania's new freight station, delayed the completion of that project fully 18 months and caused a like delay in the removal of the old freight facilities on the passenger station site. These delays together with labor difficulties on the station, resulted in a loss of time that aggregated at least four years.

Because of the loss of time in clearing the site of the new terminal and the necessity for avoiding any interference with the operation of the old station, the construction work had to be carried out in piece-meal fashion. The first track work was done on the south approach between Polk and Taylor streets. This was later extended to Van Buren street and toward Roosevelt road, but was not completed to the south end of the station property until the present year on account of a delay on the part of the city in carrying out plans for the rebuilding of the Roosevelt road viaduct. Work on the north approach could not be started until much later because the site had to be cleared by the removal of two large warehouses.

Owing to the limited track capacity of the old station it was out of the question to take any of the old station tracks out of service until other tracks could be completed to replace them. In the south unit this was carried out by completing the three westerly station tracks as far north as Jackson boulevard and constructing a temporary station for the use of suburban passengers so that these three tracks could be turned over to suburban service. Following this the tracks for the mail terminal were completed, after which new tracks were completed toward the center of the layout, gradually transferring the trains to the new tracks as the old ones were taken up.

Many Difficulties Involved

North of the concourse the first step was to provide three temporary tracks next to the river bank on ground vacated by the removal of the Pennsylvania freight house to permit the release of an equivalent trackage along the west side for the construction of new tracks, this work being carried progressively eastward until all the new tracks were in place, except those which are to occupy the site of the old station. All of this work entailed considerable difficulty in providing for a continuity of connections to the new and old tracks and in providing means for passengers to reach trains on account of the differences in elevation of the new and old tracks, the new tracks being from 3 to 5 ft. lower than the old ones. From an engineering standpoint the work also imposed considerable difficulty because of the piece-meal manner of construction. Many of the slip switches had to be

installed in place when opportunity afforded, without connection to tracks on either end, which required that their location had to be so definitely established as to insure an accurate fit with track work carried out subsequently.

Started Work on Station Building in 1919

The work on the station building was started in 1919 with the excavation of the site and the sinking of caisson foundations and the construction of retaining walls on the site of the headhouse. It was originally planned that the headhouse would comprise a structure used only for station purposes, its height being limited to that required for a waiting room with a high ceiling. The foundations for a structure so designed required 268 caissons containing 13,600 cu. yd. of concrete. However, shortly after this foundation work had been completed it was concluded that the air rights on the site occupied by this structure were so valuable that it would be unwise to construct a building which would not permit of their full development. Accordingly, it was decided to construct a building which would not only house the main waiting room and auxiliary facilities but would serve also as an office building, with an ultimate height of 22 stories. This decision at once introduced a serious problem because the loads to be imposed by a 22 story building were so much greater than those of the structure for which the foundations had been constructed that the piers already in place were entirely inadequate to carry the taller structure.

An Unusual Foundation Problem

A further complication was introduced by the fact that the new design of building embodied an extensive relocation of columns so that the position of many of the columns did not correspond to the location of the foundation piers. Under these circumstances an extensive reinforcement of the foundation was imperative.

Before undertaking this, careful consideration was given to the possibility of applying greater loads to the piers already in place than those for which they had been designed on the basis of the unit bearing pressure allowed by the building department of the city of Chicago for caissons supported on hardpan, namely six tons per square foot. This led to the construction and loading of an experimental caisson four feet in diameter by 71 ft. deep which had the support removed from beneath its bottom by digging a tunnel from a shaft sunk nearby so that the loads imposed on its top were supported entirely by the skin friction of the sides. The test made on this caisson showed that no movement occurred under loads producing a skin friction of 350 tons per sq. ft. of cylindrical surface and on the basis of these findings the city building commissioner authorized the increase in the allowable load on the caissons to 10 tons per sq. ft. The exact manner of making this test is explained in an article in the *Railway Age* for March 11, 1922, page 561.

Rebuild Foundation

However, in spite of this concession the work of strengthening the foundation was both difficult and expensive. It required the sinking of 192 additional piers from 4 to 10 ft. in diameter, some of them so close to the old ones as to introduce serious complications in excavation. In addition a large number of reinforced concrete girders had to be constructed to span across two or more of the piers for the support of columns in new locations. In such cases cantilever construction had to be resorted to as a means of relieving some of the old piers of a portion of the load applied.

This work was followed by the erection of the super-

structure of the headhouse and the completion of the Canal street structure, after which work proceeded on the excavation and foundation work for the concourse. To permit the concourse work to proceed it was necessary to provide a temporary passageway for the passengers between the old station and trains entering the station from the south, which at this time were using the new south group tracks. This arrangement, which entailed a walk of about one block from the station to the head of the passenger tracks, was probably the most serious inconvenience to which passengers were subjected as a consequence of the construction operations. Practically no delays to trains were attributable to the construction work, in fact, after the old freight stations had been removed there were more tracks available for passenger station use than were embraced in the old station facilities. As soon as the roof, walls and a portion of the floor of the new concourse were completed the passengers were provided with a passageway through this structure to the south train sheds.

Work Still to be Done

With the opening of the new station on May 15, opportunity was afforded for the wrecking of the old station and the excavation of the site for the construction of the tracks, platforms and trainsheds in the north group, upon which work could not proceed until the old station is removed. This work is now in progress. With this exception, the framework of the new train sheds is all in place and the concrete tile roof and skylights are being erected, temporary umbrella sheds being removed as fast as the new roof is completed.

The removal of the old station also makes it possible to proceed with the work of raising Canal street to the new level and widening it to 100 ft. in the block between Monroe street and Adams street, the only portion of the improvement of Canal street which has not been completed.

All of the various viaducts across the tracks are now complete with the exception of Adams street, upon which work will be undertaken shortly in connection with the construction of a new bridge across the Chicago river by the city. The conduct of these additional items of construction work will, however, result in little interference in the operation of the station.

Accessory Facilities

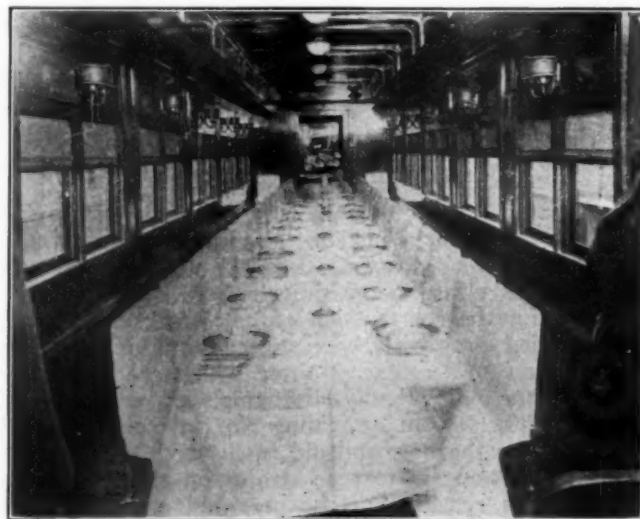
Among the supplemental facilities which have been provided to make the Chicago Union Station as complete as possible from the standpoint of service to the passengers, and which were not referred to in the earlier part of this article, are a hospital, a cell room and immigrant quarters. The cell room and immigrant quarters are in the basement, access to them being provided by a corridor leading from a stairway in the west platform of the south station track a short distance south of the train concourse. The former contains two cells, a toilet room and accommodations for police officers. The latter provides a small waiting room and toilets and lavatories for men and women. The hospital is located on the mezzanine floor at the northeast corner of the headhouse. It provides wards for both men and women, a nurses' room, receiving room and operating room.

The requirements of those trainmen for whom Chicago is an away from home terminal have also been considered in providing recreation, rest and locker rooms on the third floor. A lantern room where trainmen's lanterns are stored, cleaned and refilled, is provided in the basement.

Organization

During the course of negotiations with the city of Chicago in 1913, the Chicago Union Station Company was organized and J. J. Turner, first vice-president, Pennsylvania Lines West, was elected president. Thomas Rodd, chief engineer of the Pennsylvania Lines West, was also made chief engineer of the Chicago Union Station Company, with Joshua D'Esposito as assistant chief engineer in direct charge at Chicago. Graham, Anderson, Probst and White, Chicago, were retained as architects. In addition, an advisory board of engineers was organized which consisted of the chief engineers of the proprietary railroads, this board remaining in active service during the entire construction period. In 1919, upon the retirement of Thomas Rodd from active railway service and his appointment as consulting engineer, Mr. D'Esposito was made chief engineer. The staff which assisted him in the design of the various facilities and the conduct of the work included A. J. Hammond, principal assistant engineer, who resigned in October, 1922, and was succeeded by E. E. Stetson; E. Weidemann, engineer of buildings and structures; A. S. Holmes, assistant to the chief engineer; C. E. Cox, engineer of contracts and estimates; C. J. Noland, office engineer; E. Brock, mechanical engineer; Thomas Holt, signal engineer; C. W. Post, electrical engineer, and C. L. Swanson, chief clerk. Following the retirement of Mr. Turner in 1922, Samuel Rea was elected president of the Union Station Company.

The principal construction contractors on the project were as follows: John Griffiths & Son Company, general contractors for the headhouse and concourse; R. C. Wieboldt Company, general contractors for the mail building and foundation and steel erection contractors on the headhouse; W. J. Newman Company, contractors on excavation, wrecking, sewer construction and concrete track slab construction; Robert Gordon, Inc., heating and ventilating; O'Callaghan Brothers, plumbing; A. E. Coleman Company, ornamental iron work; Edward Moore Roofing Company, roofing; McNulty Brothers Company, plastering; Alfred Olson Company, painting; Hatfield Electric Company, electrical installation; Kelly-Atkinson Construction Company, Ketler Elliott Construction Company and Overland Construction Company, structural steel erection; and the Underground Construction Company, foundation work.



Underwood & Underwood

Banquet Car Originated by President Budd of the Great Northern

A. S. T. M. Meets at Atlantic City

Abstracts of the reports and papers which are of general interest to railway men

THE twenty-eighth annual meeting of the American Society for Testing Materials was held at the Chalfonte-Haddon Hall, Atlantic City, N. J., on June 25 to 28. A heavy program was presented and simultaneous meetings were held in order to insure its being covered following the practice adopted several years ago. The total registration was 867, or slightly in excess of the registration for 1923, and marks a new record attendance for the society. The election of officers resulted as follows: President, W. H. Fulweiler, chemical engineer, United Gas Improvement Company, Philadelphia, Pa.; vice-president, H. F. Moore, professor of engineering materials, University of Illinois, Urbana, Ill.; members of the executive committee, Louis Anderson, Jr., chemical engineer, Alpha Portland Cement Company, Easton, Pa.; E. F. Kenney, metallurgical engineer, Bethlehem Steel Company, Bethlehem, Pa.; T. D. Lynch, manager, materials and process engineering department, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.; and K. C. Mackenzie, consulting chemist, Texas Company, New York.

The Bond Between Concrete and Steel

A paper was presented by Duff A. Abrams covering the results of an investigation undertaken to determine the relation between the bond and the factors which govern the compressive strength of concrete as they are now understood. The bond tests were made by applying a pull on one end of 1-in. plain round steel bars embedded axially in 8-in. by 8-in. concrete cylinders. The concrete covered a wide range in size and grading of aggregate, quantity of mixing water and cement, and was tested at ages from 7 days to 1 year. Hydrated lime and crude oil were used as admixtures in a few tests. There were 735 pull-out bond tests, and 735 parallel compression tests on 6-in. by 12-in. cylinders.

The data presented showed the load-slip relations for pull-out tests; the relation between bond and compressive strength; the effect of grading of aggregate, quantity of cement, consistency of concrete and age at test, upon the bond and compressive strength; and the effect upon the bond of oil and hydrated lime as an admixture. The following is a summary of the results that were obtained:

1. A steel bar embedded in concrete offers considerable resistance to a pull-out load. Slipping of the bar begins at a bond stress of about 10 to 15 per cent of the compressive strength of the concrete, but considerable additional load is taken before the ultimate bond resistance is reached. For pull-out tests of the type used, 0.0005 in. end slip of bar occurred at 55 to 60 per cent of the maximum bond; for mixture lower than 1:1, the maximum bond was about 24 per cent of the compressive strength of the concrete and came at an end slip of about 0.01 in., regardless of the characteristics of the concrete.

2. Bond and compressive strength increased with age of the concrete from 7 days to 1 year. For 1:5 concrete of water-ratio 0.88, the bond at 1 year was 134 per cent of the 28-day value and the compressive strength was 148 per cent.

3. Bond responded to changes in water-ratio of the concrete in much the same way as compressive strength; increase in water-ratio due to use of wetter concrete, less

cement, or an excess of fine aggregate, resulted in material reductions in both bond and compressive strength. Other tests have shown that the same statement applies to the modulus of elasticity of concrete, impermeability, resistance to wear and resistance to destructive agencies such as weather, sea and sulfate waters, etc.

4. For mixtures richer than 1:1, the bond fell off, probably due to the greater volume changes during hardening, which is characteristic of such mixtures.

5. The use of 4 per cent of the 28-day compressive strength of concrete as the working stress in bond for plain bars, as specified by the joint committee on standard specifications for concrete and reinforced concrete is justified, as this gives a factor of safety of about $2\frac{1}{2}$ to 3 against first slip.

6. The use of crude oil to replace mixing water, in general, caused a reduction in both bond and compressive strength of concrete. Five per cent of oil reduced bond at 28 days about 20 per cent; at 1 year, about 6 per cent; compressive strength at 28 days and 1 year was reduced about 3 per cent.

7. Replacing cement with hydrated lime decreased the compressive strength and bond about 1.2 per cent for each 1 per cent of hydrated lime in terms of volume of cement or about 2 per cent for each 1 per cent by weight.

8. The pull-out test of the form used in this investigation is a satisfactory form of specimen for comparative studies of bond.

Methods of Curing High-Alumina Cement

A paper was presented by H. S. Mattimore on some experimental work undertaken by the Pennsylvania Department of Highways, to test the efficiency of a high-alumina cement for the purpose of making early high-strength concrete. During these tests it was noted that defective surface conditions resulted when such concrete was cured by methods which had been effective in the curing of portland-cement concrete. Accordingly, several series of test slabs were cured under two conditions, one, a combination of wet burlap and ponding curing, and the other ponding curing alone. Provision was made in this test for the measurement of the temperatures in the slabs at various periods during curing.

The following definite conclusions were drawn from the results of the tests:

1. High-alumina-cement has compressive and transverse strengths at 24 hours greater than those of portland-cement concrete at 28 days.

2. Wet burlap curing, effective for portland-cement concrete, increases the temperature during hydration and produces a defective surface when used with high-alumina-cement concrete.

3. Application of moisture at too early stages, either by sprinkling, ponding or covering with wet burlap, produces a dusty or scaled surface.

4. Water curing should be started when hydration is well under way as indicated by a rise in temperature. This can be detected by a stiffening of the surface and a drying out appearance. Under laboratory humidity and temperature conditions, the safe period was found to be 7 hours after mixing.

5. Storage or air curing in bags reduces the high tem-

perature during hydration and also delays the hydration. After four months' storage in bags the hydration was delayed about two hours.

Subsequent discussion of this paper indicated that the above conclusions were, in general, applicable to a wide range of concrete work wherein high alumina cements were used.

Corrosion of Iron and Steel

The sub-committee on inspection of the Fort Sheridan, Pittsburgh, and Annapolis tests, reported a few additional failures at the Fort Sheridan and Annapolis locations, the Pittsburgh tests being completed in 1923, with the rate of corrosion at these two locations continuing very slow. With two exceptions, the failures at these stations were confined to the light-gage, non-copper-bearing groups, several entire groups of non-copper bearing metals having failed at Fort Sheridan.

The sub-committee on total immersion tests reported additional failures at Annapolis and Washington locations and presented tables giving the record of failures at these points. It was noted that the light gage sheets at Annapolis immersed in the brackish water of the Severn river showed approximately 40 per cent longer service than the same group of sheets exposed in Washington City water and about 26 times the service life of sheets immersed in mine water. The sub-committee has completed arrangements for extending the tests to include immersion in ocean water at Portsmouth, N. H., and Key West, Fla.

The sub-committee on field tests of metallic-coated products reported substantial progress in developing the details of its comprehensive exposure tests which will include hot-dipped galvanized sheets of five different weights of coating, the base metals being non-copper-bearing and copper-bearing commercial open-hearth steel and pure iron, zinc-coated wire of four weights of coating on the Common, Siemens-Martin and Extra-High-Strength stands and applied by the hot-dipped process as ordinarily applied, and as modified to give a preliminary carbonization, and a subsequent heat treatment or annealing. Chain link fencing of two weights of coating will be tested, as well as structural shapes, hardware, and line materials coated by different process. This test is attracting widespread interest since there is apparently little authentic comparative data on the relative resistance of various metallic coatings under the different atmospheric conditions in this country.

Accelerated Corrosion Tests on

Bare Overhead Electrical Conductors

A paper presented by Frank F. Fowle described a laboratory method of simulating the corrosive influences of unfavorable outdoor atmospheres found in land regions of the city or industrial sites, which affect the usual types of bare or uninsulated overhead electrical conductors, including galvanized iron and steel. The test apparatus comprised a closed box about 16 ft. long, 5 ft. wide and 4 ft. high, with associated equipment for introducing warm dry air, humid air, dilute bituminous coal smoke, and fine water spray, at will. These four conditions were introduced in the order named, with a total cycle of 8 hours, repeated approximately 800 times. There were 21 specimens of wire and strand, including copper, aluminum, copper-clad steel, galvanized iron and galvanized steel; also a new type of stranded conductor, consisting of six outer wires of galvanized steel and a center wire of tinned or galvanized copper.

The conclusions drawn as to the relative performance of the various specimens in resisting the attack of

simulated corrosive conditions of unfavorable outdoor atmospheres, under accelerated application, are as follows:

1. The copper and aluminum wires and strands did not show serious corrosion up to 302 cycles and there were no marked failures at any time either in the copper-clad steel or in the reinforcing wire of the aluminum cable.
2. There is little, if any, difference between the corrosion in solid wire and stranded wire of the same grade of material.
3. The copper-center steel strand resists corrosion fully as well as the standard material of the same grade.
4. The higher the carbon content of the galvanized iron and steel specimens, the greater is the apparent resistance to corrosion.

Other Reports and Papers

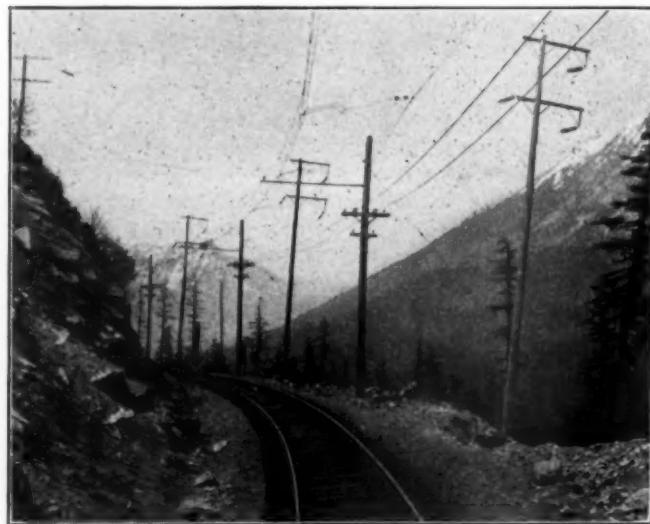
Among the other reports and papers which were presented and which are of general interest to railway men are the following: Committee A-3 on cast iron announced a proposed change in the dimensions of the arbitration bar which has been the standard of the society since 1905. In connection with this change, there will be involved corresponding changes in the standard specifications for grey iron castings, high test grey iron castings, locomotive cylinders, and soil pipe and fittings.

Committee D-7 on timber presented the revision of the grades for structural timber offered as information in 1924 and discussed its relation to the development of basic grades for structural timber by the Central Committee on Lumber Standards.

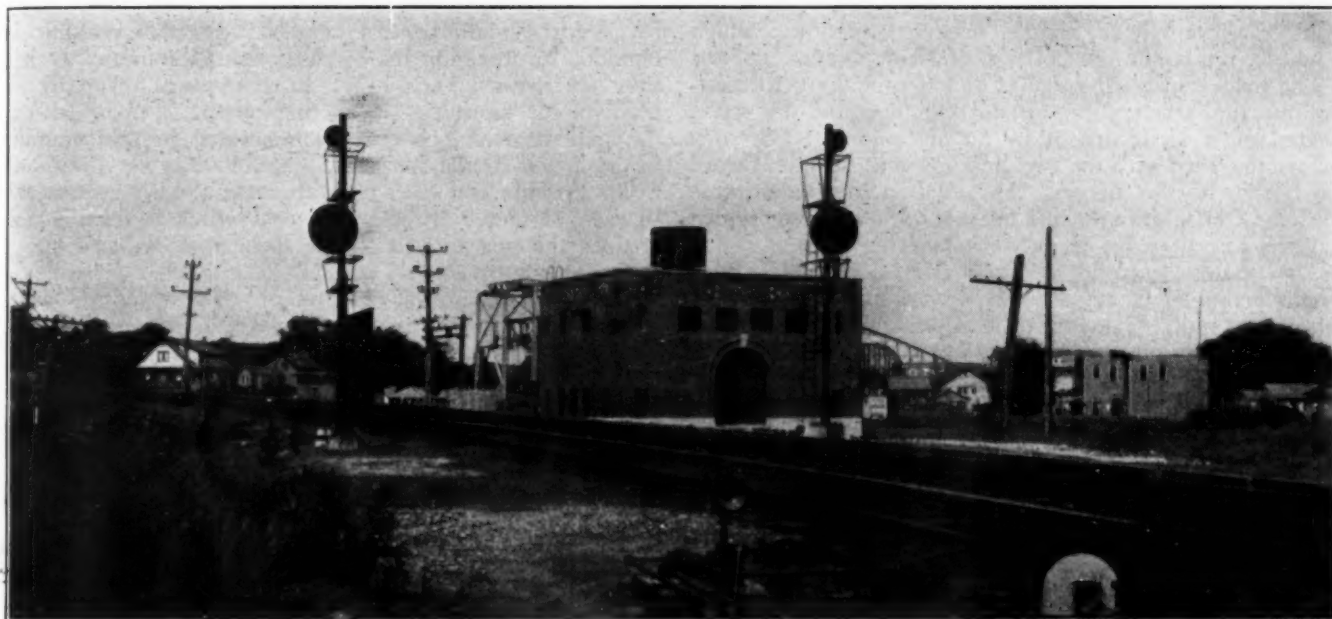
Committee A-1 on steel presented, among other recommendations, new specifications for car and tender axles to replace the present standard specifications.

H. F. Connerman presented a paper on the effect of the size and shape of test specimens on the compressive strength of concrete. The test showed that the 6-in. by 12-in. cylinder recommended by the society as standard was a satisfactory form of compression specimen for concrete for aggregates up to about 2 in., and that the ratio of diameter of cylinder to maximum size of aggregate should not be less than about 3.

S. H. Ingberg presented a paper on the fire resistance of gypsum partitions which covered a wide variety of tests made at various times to determine the fire resisting properties of this material when used in partitions.



Along the Western Slope of the Cascades in Washington on the Electrified Section of the St. Paul



South Beach, Staten Island, Showing New Signals, Automatic Substation and Transmission Line

Staten Island Electrification

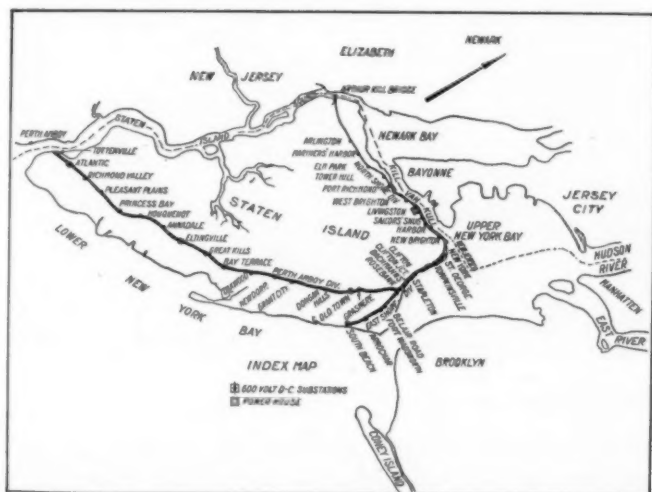
Power is supplied to multiple unit equipment by automatic substations

ELECTRIFICATION of the passenger service of the Staten Island Rapid Transit Railway Company was formally completed on July 1. The railway company is a subsidiary of the Baltimore & Ohio, and operates lines extending from St. George to Tottenville

Junction the principal business section of St. George is served.

Ferry service is operated across the river between Tottenville and Perth Amboy, New Jersey. The East Shore line operating between St. George and South Beach, a distance of approximately four miles, serves in addition to its normal residential traffic a heavy summer season resort traffic. The New York Municipal Ferry operates between the Battery in lower Manhattan and St. George, and also between St. George and 39th street, Brooklyn. A line on the north side of the island known as the North Shore division handles traffic that is mostly industrial. Service on these lines has been operated by means of light steam trains made up of from two to six wooden coaches.

To carry out part of the plan to electrify all railway service in the city of New York, the East Shore and Perth Amboy divisions have been electrified for operation on 600 volts direct current. The arrangement provides for an over-running third-rail system, such as is used in the subway and on the elevated systems. Trains are of the multiple-unit type similar to those in subway service, and consist of from one to five cars. These trains are handled entirely by engineers who formerly operated steam locomotives.



Map of Staten Island, Showing Electrified Sections of Staten Island Rapid Transit

along the south shore of Staten Island in Borough of Richmond, New York City, with a short branch from Clifton Junction to the residential and summer resort section at South Beach. The line to Tottenville, known as the Perth Amboy division, which is 14 miles in length, serves principally residential sections beyond Clifton Junction. Between St. George Terminal and Clifton

Rolling Stock

There are 90 motor cars in all of a design similar to those used in subway service. The cars were built by the Standard Steel Car Co. at Hammond, Ill., and are equipped with General Electric motors and control. They have a seating capacity of 71 and a total capacity of 186. Power is taken from a 600-volt top contact third rail and is controlled by a G-E electro-pneumatic type controller. The main controller is actuated from the motor-

man's position by a simple master controller, which handles circuits for the 200 hp. 600-volt motors.

The main controller consists of ten contactors for controlling the acceleration of the car operated by cams located on a shaft driven by an air engine. The contactors together with the two line breakers open and close the circuits to the motors. Mounted in the same frame with the contactors and line breakers is a reverser which controls the direction of movement of the train.

The master controller operates from a 32-volt battery circuit arranged to actuate the several motor controllers through a multi-conductor train cable. The storage battery is the Edison B-1 H type and is normally charged by being connected in the negative side of the compressor circuit. Relays are provided for the control of battery charging and if the battery drops below 28 volts an additional charge is automatically made from the third rail through a resistance.

Each car carries four contact shoes which are connected to a train line bus connecting all of the shoes on the train. Power is, therefore, available when anyone of the third rail shoes is in contact with the rail.

Another feature is a bus line switch located at the end of each car by means of which the bus line can be disconnected from the coupling while making up the train. This is easily accessible to the trainmen when coupling cars and precludes the possibility of the brakeman coming in contact with any live part.

The master controller includes two drums, one for reverse and the other for forward operation. The reverse drum has three positions—off, forward and reverse. The main cylinder has four positions including off, switching, series and parallel positions. In the switching position all motors and resistance are in series for switching move-

reverse and main control handles. Electric braking is obtained by changing the connections of the motor so that they act against each other as generators through the main motor resistors, the momentum of the car driving the generators. The current generated in this manner is dissipated in the resistors.

To provide for emergency operation with one motor in case of motor trouble a cutout switch is used which enables the operator to handle the car at reduced speed with one motor.

The gear ratio is 62/21 and provides a speed on the series connections of approximately 20 miles an hour, and on the full parallel of approximately 50 miles an hour. The maximum speed is obtained with reduced field connections.

All doors are operated by electro-pneumatic door engines, controlled by push-buttons located at the center and ends of the cars. The control circuits for these devices are connected to the 32-volt battery. To prevent the doors being opened while the car is in motion, a safety relay is provided which prevents the door engines from acting until the car comes to a stop. Provision is made for the independent operation of the door of the motorman's cab.

The cars are heated electrically by power from the 600-volt bus by means of coil type heaters located under both longitudinal and cross seats. The panel in the motorman's cab controls the heaters, providing for the use of power on either all or part of these heaters. The temperature of the car is further regulated by a thermostat which automatically opens and closes the heater circuit.

Lighting is provided by four 600-volt circuits of five lights each, controlled from a master switch on the main switch panel. The headlight is also controlled from this



Motor Car Train on South Beach Line

ments. When the master controller handle is moved to either the series or parallel position, the train begins to accelerate automatically and continues to increase its speed up to the full series or parallel connection of the motors.

Master controllers are equipped with the usual dead-man's release and also are so connected that an emergency application of the brakes is made when the control handle is released unless the reverse handle is locked in the neutral position.

One of the novel features provided on this equipment is an arrangement for dynamic braking, which can be used in case the power is cut off from the third rail. This connection is obtained by the motorman by operating the

panel, including four marker lights, two in the upper deck and two just above the floor line of the car; color changing devices are provided by which green, yellow or red display may be obtained for each of the two upper marker lights. A tell-tale signal in the motorman's cab gives indication when all of the doors of the train are closed. Six small emergency lights are also provided which light automatically when the third rail is cut off from the train.

Contact System

Contact shoes on the cars collect current from the third rail. The rail is a 150-lb. B.M.T. section made of copper bearing steel by the Bethlehem Steel Company.

Each section is 39 ft. long and is mounted on Ohio Brass porcelain insulators. Shields and splice plates for the wooden rail guards were supplied by the Shield Electric Company.

On the greater part of the line, the third rail joints are bonded by four 400,000 c.m. flexible copper bonds gas-welded to the rail ends. On one part of the South Beach line there are two 1,000-ft. lengths of third rail in which the joints have been welded by the Thermit process. The rail is sectionalized at certain points by Albert & J. M.



Type of Steam Equipment Replaced by Electric

Anderson sectionizing switches enclosed in wooden boxes placed between the two tracks.

The running rails are 100-lb. rails. The joints are bonded by two 250,000 c.m. flexible copper bonds on each rail, gas-welded to the head of the rail. Manganese rails are used in the St. George terminal yard.

Power Supply

Electric energy for the system is supplied from five substations with an aggregate capacity of 10,000 kilowatts located respectively at St. George, South Beach, Old Town, Eltingville and Atlantic. Each of these substations, with the exception of the one at St. George, is automatically operated, while the St. George substation is equipped for semi-automatic operation.

A complete system of supervisory control, centralized in the traffic operator's office at St. George, places the control of the entire power system in the hands of the traffic operator, located at St. George, who will be continuously and automatically advised of the status of the power system.

Primary power at 33,000 volts, 3-phase, 60 cycles is purchased and supplied over two circuits to each substation from the new Livingston power plant of the Staten Island Edison Corporation. In order to meet a normal increase in demand for electric power, and to provide sufficient generating capacity for the operation of the railway system, the power company has remodeled and greatly enlarged the generating station at Livingston. The new equipment provides a complete new boiler plant from stokers to stack and a new 18,750 kv-a., 13,800-volt, 3-phase, 60-cycle, turbine generator with auxiliaries operating from a 2,300-volt, 3-phase bus. Existing generating equipment generates, for the most part, at 660 volts with some smaller part at 2,300 volts.

New Signal System

The old train signalling system which was unsuited for operation on the electrified system, has been replaced by

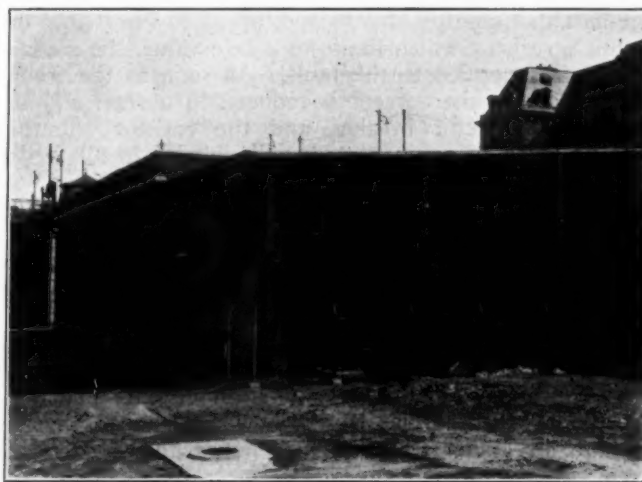
a complete automatic block signalling system which receives energy for its operation from 2,300-volt, single-phase, 60-cycle lines. Located at four substations are transformer banks stepping down the 33,000-volt supply to 2,300 volts. Arrangements have been made so that each of a number of sections of the signalling system may be supplied normally from but one source. However, in the event of failure of the normal source of supply, such section may readily be transferred to another circuit, thus preventing failure of the signals involved. The supervisory control system also places the control of the power supply to the block signal system in the hands of the traffic operator at St. George.

The St. George Substation

The St. George substation building is located in the terminal yards at St. George. As it is in a position which brings the roof of the building almost on the street level, semi-outdoor construction for accommodation of the 33,000-volt switching equipment was resorted to in order to prevent exposure of the high-voltage equipment to the public thoroughfare.

The portion of the power company's substation equipment which is indoors includes iron-clad, truck-type switching for a 2,300-volt, 3-phase, double bus system for local distribution of light and power. Located in this station is also the supervisory control equipment for the operation of the 33,000-volt switching equipment at the Clifton Junction station.

The portion of the building occupied by the railway company provides space for four synchronous converters together with necessary transformers and switching equipment. Three 1,000-kw., 600-volt, shunt-wound, 60-cycle converters with auxiliary equipment comprise the present



The St. George Semi-Automatic Substation

installation. However, the space available will accommodate converters of at least double that rating.

With the exception of the manual starting equipment, much of the switching equipment is automatic in its operation and a duplicate of that installed in the automatic substations at South Beach, Old Town, Eltingville and Atlantic, as later described.

Built into one corner of the machine room on the front side of the building is a two-story structure, the second floor of which is occupied by the chief traffic operator. The first story is divided into two separate parts, one serving as a battery room. The other is occupied by the traffic operator and in it are installed the telephone and supervisory control equipments which respectively put the

operation of all trains and substation equipment under his supervision.

The Automatic Substations

Except for slightly different arrangements, the railway substation installations at South Beach, Old Town, Eltingville and Atlantic are the same. The Atlantic substation is at present equipped with only one converter unit, but provision has been made for a second, so that when it is installed the station will be practically a duplicate of the three other automatic stations.

The installation at each of the automatic substations comprises an outdoor structure, which accommodates two power transformers, signal transformer and switching equipment, the high tension switching equipment, lightning arresters and outdoor metering equipment; also a brick building, housing two 1,000-kw., 60-cycle, shunt-wound synchronous converters together with the automatic switching equipment.

Scheme of Control

The automatic stations are unattended except for periodic inspection. When the third rail voltage drops to or below some predetermined minimum, the station automatically comes into service by means of a contact-making voltage relay which is connected across the circuits to the third rail and the running rails.

To protect the machines from damage due to short circuits between the third rail and the running rail, a 3,000-ampere, full-automatic, electrically operated, high-speed circuit-breaker is connected to the machine circuit between the machine and the direct current feeder bus. Should an abrupt rise of current in excess of the momentary rating of the machine occur, this breaker, which operates to limit the current in from four to seven and one-half thousandths of a second, opens to insert into the circuit a resistor which limits to a safe value, the amount of current supplied to the fault. As soon as the feeder breaker opens, the current is reduced to normal and the high speed circuit breaker and the resistor shunting breaker close to again restore full voltage to all feeder sections except the one on which the trouble occurs.

Each third rail feeder circuit is so arranged that, as soon as the short circuit is removed, the voltage relay transmits an impulse to the closing relays which operate to reclose the feeder breaker and re-establish the power circuit to that section.

In the substations containing two converters, the acceleration and normal operation of trains during non-rush hours will require the operation of only one unit. When the load becomes heavy, however, due to the use of more or longer trains in rush hours, the second converting unit automatically starts up in parallel with the first in exactly the same sequence of operation as that set into operation by the voltage relay in starting the first machine.

When the load demand on the substation falls to such a value that one machine can supply it and remains at or below this value for a predetermined length of time the machine which was the second to be placed in operation will be the first to be shut down. Further decrease in demand, making unnecessary the operation of the first unit, will result in it being taken out of service until further decrease in third rail voltage demands its operation.

The synchronous converters used in these stations are capable of delivering 50 per cent overload for two hours after reaching a constant temperature at full load, and are also capable of operating at 300 per cent of rating momentarily.

Protective Devices

In addition to the features of high-speed circuit-breaker protection, protection from abnormal overloads and the operation of feeder circuits, to clear faulty third rail feeder sections, there are numerous other "watch dogs" which protect the substation equipment. For instance, if the load shifting resistors, due to continued service, heat excessively, a thermostat operates to disconnect the machine from the load entirely until the resistor has cooled to a safe operating temperature. The machine is then automatically restored to service.

Also excessive temperatures of machine or transformer windings are prevented by thermal overload relays, which,



Interior of South Beach Substation

in case of temperatures above a safe limit, take the machines out of service long enough to reduce the temperature to safe values and then automatically restore them to service.

If a machine bearing heats excessively, temperature relays on the bearings remove and hold the machines from service until restored manually.

A phase balance current relay shuts the machine down in the event of unbalanced phase conditions which would prove detrimental to the operation of the equipment. If the fault is within the substation, the equipment is locked out of service until the conditions responsible for the unbalance have been corrected. If the unbalanced condition is the result of a fault outside of substation, the equipment is merely taken out of service until the condition is corrected, when service is automatically restored.

Voltage conditions, such as excessively low voltage, unbalanced voltage or reversed phase, are guarded against by relays which hold the equipment out of service under such conditions. These and other devices, such as overload relays, overspeed devices and reverse current relays, which are part of every manually operated substation equipment, provide still further protection.

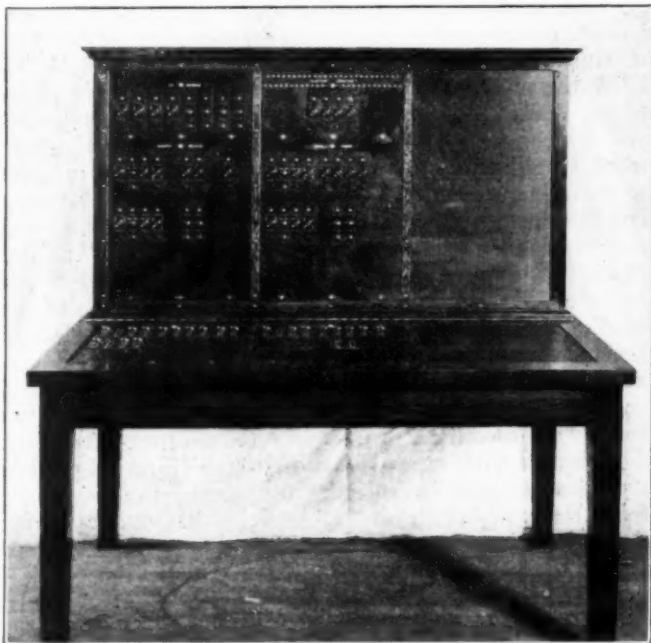
Supervisory System

Experience in the operation of hundreds of automatically controlled substations has demonstrated their superiority of performance over manually operated equipment. However, automatic equipment set to perform a definite cycle of operations under given conditions cannot exercise judgment as to when it may be desirable to alter its performance. For example, due to an accident to a train which would make it necessary to discharge passen-

gers at some point other than at a station platform, it would be desirable to de-energize the third rail as a matter of safety.

To give these "human" powers of communication to the automatic substations and to provide a means by which a person intelligently informed may exercise his best judgment as to the best operation of the apparatus a supervisory control system has been installed. From a certain point located in the traffic operator's office at St. George substation four wires constituting two pairs of a telephone cable radiate to each of the four automatic substations. On the traffic operator's control desk are located a control key and indicating lamps for each device in each station for which supervisory control has been provided. These keys and lamps are of the size and similar to such devices used on telephone switchboards. Small multi-contact control relays mounted near the desk in a steel cabinet and connected with similar installation at each substation causes the devices in the substations to function in response to the operations at the desk, initiated by the dispatcher.

In the operation of a signal to the dispatcher to indicate the automatic operation of a device at the substation the dispatcher in addition to receiving an audible signal notes the change in lamp indication that shows which device on the system operated. If the function were that of closing a circuit-breaker, the red lamp associated with that particular breaker would be lighted. Opening of the breaker would be shown by the lighting of the green



Traffic Operator's Central Desk

lamp. Since the positions of the keys on the control desk indicate the previous status of the system, the change is immediately apparent even though the dispatcher were unaware of a change in color of the lamp indication.

Normally all equipment in the supervisory system is at rest. It functions only in response to operations initiated by the traffic operator or the automatic operations of the substation equipment. Should the supervisory system, for any reason, fail to function, the stations remain under full automatic control. By means of this system the traffic operator may open or close any of the main power circuits and is able to start or stop any of the machines in the automatic stations.

The railway substation equipment and the switching

equipment installed in the generating station and substations of the power company were supplied by the Westinghouse Electric & Manufacturing Company. Engineering and installation of the power company's equipment was by the J. G. White Engineering & Management Corporation. Engineering on the railway substation was under the direction of J. H. Davis, chief engineer of electric traction, and J. S. Hagan, special engineer, both with the Baltimore & Ohio Railroad Co. Installation of the railway substation equipment was made by the New York Service Department of the Westinghouse Electric & Manufacturing Company under the direction of H. D. Macy. R. B. White, general manager of the New York Terminal Lines of the Baltimore and Ohio Railroad, is in charge of operation of the Staten Island Rapid Transit Railway System.

Information in this article concerning power supply was furnished by C. A. Butcher, general engineer, Westinghouse Electric & Manufacturing Co.

L. & N. Train Control

WASHINGTON, D. C.

THE Interstate Commerce Commission has made public a letter to W. L. Mapother, president, Louisville & Nashville, regarding the preliminary inspection of the installation of the Union Switch & Signal Company's two-speed continuous inductive system of automatic train control on the 17-mile single track section of the line between Madisonville, Tenn., and Etowah, Tenn. As a result of this inspection, the following criticisms and comments are offered:

1. It is suggested that the out-in feature at the beginning of train control territory in this installation be carefully considered with a view to possibly securing increased protection, for while the wayside and cab signals are intended to apprise the engineman of a failure of the device automatically to cut-in, this method involves reliance upon the human element.

2. No interference from foreign current influences was reported, and none observed during the inspection, nor was there any evidence of foreign current having been existent at any time. However, should such condition later develop, effective means will have to be provided for overcoming the trouble.

3. It is understood that, in general, the pneumatic apparatus on the locomotives has been so installed as to prevent trouble from vibration, dirt, water, etc., and while no such trouble has been reported or observed on this installation, nevertheless, as with all air brake devices, the freezing of any one of several valves in normal position may constitute a potential source of serious failure and it is, therefore, believed well to call attention to the necessity of preventing moisture from accumulating in these valves under conditions which can result in the sealing closed of their ports.

4. No provision has been made in this installation for having enginemen acknowledge at succeeding stop-signals.

5. Provision should be made for keeping accurate records of daily terminal tests and repairs, as well as for the making of adequate reports of performance.

Commissioners McChord and Esch approve this letter, Commissioner McManamy, the other member of Division 1, asks to be noted as not concurring in the criticisms because of their relative unimportance and because they are not based upon anything contained in the order under which the installation is being made.

ELECTRIC OPERATION of the Danbury branch of the New York, New Haven & Hartford, which extends northward from South Norwalk, Conn., to Danbury (24 miles) will be begun on July 10.

Baltimore & Ohio Earning Power

Evidenced in 1924 by largest net of any year with single exception notwithstanding decreased coal traffic

THE Baltimore & Ohio annual report for the year ended December 31, 1924, issued on Monday last, shows net income after interest and other charges of \$16,319,690, equivalent, after allowance for the 4 per cent preferred dividends, to \$9.19 per share on the \$151,943,367 common stock. This compared with \$22,422,036 in 1923, equivalent after allowance for preferred dividends, to \$13.21 per share on the common.

The Baltimore & Ohio's net income in 1923 was by far the best in the company's history. Although the 1924 net was less than that of 1923 by \$6,102,346, it was approximately \$3,000,000 more than that for either of the best two years other than 1923, namely, the fiscal year ended June 30, 1916, and the calendar year ended December 31, 1916. Furthermore, it was nearly double the net income for the best year between 1916 and 1923, namely, 1919, when Baltimore & Ohio net income was sustained by the standard return for operations by the Railroad Administration.

Change in Situation

In view of the remarkable improvement which has taken place in the past two years in Baltimore & Ohio net income, it is a bit difficult to realize that not more than three years ago observers were much worried for fear the road might be unable to meet its \$131,000,000 bond maturities in 1925. Only two years ago, when the Baltimore & Ohio restored its common dividend, it was made a question in many quarters as to whether this dividend could be maintained in years of decreased traffic. The Baltimore & Ohio had a substantial decrease in traffic in 1924. As a matter of fact, its revenue ton-miles were 14.96 per cent less than in 1923, and less also than in 1917 or 1920. In spite of this the road was able to report the best net income for any year in its history with a single exception.

The Baltimore & Ohio operates 5,196 miles of line, excluding 97 miles of trackage rights for passenger traffic between Philadelphia and New York. Its New York freight terminals are reached over connecting lines east of Philadelphia by virtue of an operating agreement with the Reading and Central Railroad of New Jersey. Its lines extend from Philadelphia and Baltimore via Cincinnati to St. Louis and via Pittsburgh and Youngstown to Chicago. In addition, it has various cross lines which give it no less than five outlets on Lake Erie, namely, at Toledo, San-

dusky, Lorain, Fairport and Cleveland, besides which it has various feeders which carry it notably into a considerable portion of West Virginia, etc.

Few other roads have devoted so much attention in recent years to bringing about a diversification of traffic. In this it has succeeded, although it is nevertheless still predominantly a soft coal carrier. Its traffic in 1924 was divided as follows: Products of agriculture, 4.7 per cent; products of animals, 1.4 per cent; products of mines, 59.7 per cent; products of forests, 5.1 per cent; manufactures and miscellaneous, 26.8 per cent, and l.c.l. freight, 2.3 per cent. In 1924 the Baltimore & Ohio originated 63.19 per cent of its traffic as against 63.94 per cent in 1923.

Coal Traffic

The Baltimore & Ohio's bituminous coal tonnage was 16½ per cent less in 1924 than in 1923. The bituminous tonnage of the New York Central in 1924 was about 30 per cent less than in 1923; the Pennsylvania had a decrease of 15 per cent and the eastern district as a whole had a decrease of 10 per cent in tonnage originated and of 11 per cent in total bituminous tonnage carried.

Bituminous coal constituted 42.9 per cent of the total revenue tonnage of the Baltimore & Ohio in 1924. In 1923, the proportion was 45.0 per cent. During a period of ten years the proportion of coal has varied between 40 and 50 per cent without, however, showing any definite trend in either one direction or the other. The products of manufactures in this period, however, have shown a steadily increasing proportion. The Baltimore & Ohio coal originates in five important fields. Prior to the time when the union mines began to be handicapped by the Jacksonville wage agreement, about one-third of the road's total tonnage came from the West Virginia or Fairmont field, about 18 per cent from the Meyersdale or Somerset district, about 13 per cent from the Pittsburgh or Youghiogheny district, about 8 per cent from the Cumberland or Piedmont district and about 26 per cent from the Ohio or Pittsburgh No. 8 district. These proportions are now, of course, substantially changed, the tonnage from the Pittsburgh and Ohio fields having been practically eliminated. Eastbound Baltimore & Ohio coal moves to the Baltimore terminal at Curtis Bay or it is turned over to the Western Maryland at Cherry Run or to the Cumberland Valley at Martinsburg for movement via Shippensburg, Pa., and thence via the Reading to

BALTIMORE & OHIO OPERATING RESULTS, SELECTED ITEMS, 1914 to 1923.

Year ended June 30	Mileage	Revenue tons	Revenue ton-miles	Average haul	Revenue per ton-mile cents	Revenue train load	Revenue car load	Total operating revenues	Total operating expenses	Net operating revenue	Net railway operating income	Net after charges
1914....	4,515	72,267,060	14,054,422,000	194	0.544	645	26.97	99,164,010	74,403,389	24,760,621	19,964,843	9,250,024
1915....	4,535	64,375,595	12,970,894,000	201	0.546	692	27.44	91,815,797	63,925,508	27,890,290	23,016,114	10,780,881
1916....	4,539	80,785,993	15,793,945,000	196	0.560	761	28.42	111,668,680	79,319,804	32,348,876	27,044,896	13,692,447
Year ended Dec. 31												
1916....	4,712	87,785,876	17,004,704,000	194	0.562	760	28.20	121,793,842	87,780,154	34,013,688	27,491,028	13,184,390
1917....	4,989	93,516,882	18,144,817,000	194	0.591	785	29.61	139,851,910	108,093,666	31,758,244	22,593,969	8,095,231
1918....	5,152	95,346,229	17,032,281,000	179	0.763	815	....	175,259,575	161,933,591	13,325,984	7,193,131	5,042,106
1919....	5,154	88,862,248	17,203,592,000	194	0.795	847	....	182,620,016	170,348,032	12,271,984	5,066,914	8,580,022
1920....	5,155	101,924,520	20,932,667,000	205	0.873	873	33.71	231,944,443	226,399,308	5,545,135	4,466,041	7,245,481
1921....	5,235	71,573,662	14,209,155,000	199	1.103	712	30.02	199,077,853	167,072,093	32,005,760	21,853,547	6,388,891
1922....	5,212	78,565,692	15,053,799,000	192	1.060	762	28.85	200,843,170	165,021,374	35,821,795	23,735,005	4,375,373
1923....	5,207	107,254,773	20,616,285,000	192	1.012	793	29.54	255,594,435	199,323,961	56,270,474	42,133,129	22,422,036
1924....	5,196	94,078,116	17,532,965,000	186	1.028	786	28.32	224,318,795	172,752,632	51,566,162	38,084,324	16,319,690

Philadelphia, New York or to New England. At the present time the Baltimore & Ohio is delivering coal at three lake ports, namely, Toledo, Lorain and Fairport. Its dumpings at these ports in 1924 were considerably less than in 1923; they were, however, exceeded by those of only two other carriers, the Pennsylvania, which delivers at four ports, and the Hocking Valley, which delivers at one.

Revenues and Expenses in 1924

It has been noted that the Baltimore & Ohio's bituminous coal tonnage in 1924 was 16½ per cent less than in 1923. The total revenue tonnage was 12.28 per cent less and the revenue ton-miles 14.96 per cent less. The freight revenues amounted to \$180,179,357, constituted 80.32 per cent of all revenues and were 13.62 per cent less than in 1923. The total revenues were \$224,318,795 compared with \$255,594,435 in 1923, and represented a decrease of \$31,275,640 or 12.24 per cent. As against this decrease in total operating revenues there was a decrease of \$26,571,329 in total operating expenses. The 1924 total of expenses was \$172,752,632 as compared with \$199,323,961 in 1923, the decrease being 13.33 per cent. The 1924 operating ratio was 77.01 per cent; that for 1923, 77.98 per cent.

Of the total decrease in operating expenses, over one-half was in maintenance of equipment. The expenses for maintenance of way and structures decreased \$2,680,338

car situation as of several selected months will be of interest.

	Locomotives unserviceable	Bad order cars
January, 1922	32.1	14.3
January, 1923	22.0	9.4
January, 1924	17.1	7.0
January, 1925	25.6	11.2
March, 1925	27.0	9.6

In April, 1925, the Baltimore & Ohio had 124 locomotives stored in serviceable condition and 2,205 cars.

Net Railway Operating Income

The Baltimore & Ohio's net operating income or net after equipment and joint facility rents in 1924 totaled \$38,084,324 as compared with \$42,133,129 in 1923, a decrease of \$4,048,806 or 9.61 per cent. It was equivalent to a return of 4.92 per cent on the company's property investment devoted to transportation purposes. Inclusion of the separately operated properties, namely, the Baltimore & Ohio Chicago Terminal and the Staten Island Rapid Transit, would have made net railway operating income for the system \$38,245,514, equivalent to 4.67 per cent on the combined property investment.

It is worth while at this point to effect a comparison with the Baltimore & Ohio's standard return for operations during federal control or the annual average of net railway operating income for the three years ended June 30, 1917. The standard return for the property itself



The Baltimore & Ohio

or 9.14 per cent. Transportation expenses showed a decrease of \$9,362,906 or 9.89 per cent, and the ratio of these expenses to total operating revenues was 38.03 per cent whereas in 1923 it was 37.04 per cent.

Big Decrease in Maintenance of Equipment Expenses

Maintenance of equipment expenses totaled \$48,659,504, which amount was \$15,221,968 or 23.83 per cent under the total for 1923. This decrease had the effect of restoring maintenance of equipment expenses to more normal levels, which is indicated in part at least by the fact that the decrease in 1924 under 1923 was approximately the same as the increase in 1923 over 1922. Analysis of the primary accounts under maintenance of equipment shows that over half of the decrease in the maintenance of equipment account was in repairs to freight cars, charges for which decreased \$8,158,364 or 35.5 per cent from the figure in 1923. The charges for repairs to locomotives decreased \$5,666,086 or 23 per cent. The following comparison of the unserviceable locomotive and bad order

was \$27,744,740. Net railway operating income in 1923 was 52 per cent in excess of this amount and net operating income in 1924 was 41 per cent in excess. The purport of this comparison is made clear when it is realized that the Baltimore & Ohio's proportionate increase in net operating income over the standard return in each of these years was approximately double that shown by the carriers in the eastern district as a whole or, if it is pointed out, that in the country as a whole the net operating income in 1923 was only about 8 per cent in excess of the standard return and in 1924 only about 9 per cent.

Reasons for Increased Earning Power

This increase in Baltimore & Ohio earning power has come partly from increased traffic. Thus, the revenue ton-miles in 1924, while less than in 1917, 1920 or 1923 were 11 per cent greater than for the year ended June 30, 1916, the middle year of the test period. In the eastern district as a whole, the traffic handled in 1924 was about the same as in the year ended June 30, 1916,

although in the country as a whole there was an increase of about 14 per cent. Another explanation is the increase in earnings per ton-mile. The revenue per ton-mile of the Baltimore & Ohio in 1924 was 1.028 cents as compared with 0.560 cents in the fiscal year ended June 30, 1916. This is an increase of 84 per cent, whereas for the eastern district as a whole there was an increase of about 73 per cent. The Baltimore & Ohio's greater increase is principally explained by the increasing proportion of manufactured and miscellaneous commodities which in 1916 totaled 24 per cent of the road's total tonnage and in 1924 nearly 27 per cent.

When all is said and done, however, the fact that must receive greatest consideration in the analysis of the Baltimore & Ohio situation is the entirely different character of the railroad from what it was only a few years ago. Daniel Willard became president of the Baltimore & Ohio in 1910, and the years of his presidency have been characterized by the carrying out of an elaborate program of rehabilitation and upbuilding of the property, which has enabled it on the one hand to secure an increasing amount of high grade freight and on the other to handle its business with greater economy. The best way to express this is to refer back to statements made at the time that the company was unable during the period of federal control and the two years immediately following to realize on its improved situation. The results of 1923 and 1924, in which years more normal conditions have ruled, make it plain that the claims of the officers of the Baltimore & Ohio that the property has been greatly improved were not exaggerated.

Ease of Refunding Maturities

This is the background which assists one to explain the comparative ease with which the Baltimore & Ohio has succeeded in refunding its 1925 maturities, which caused everybody interested in the property so much worry only a few years ago. These maturities totaled \$131,125,280 of which \$120,000,000 became due this week. The larger part of this amount was in the prior lien $3\frac{1}{2}$ per cent

been retired. In April, 1925, the company concluded arrangements for extending the \$45,000,000 Southwestern Division bonds which matured on July 1, this financing being at 5 per cent. The result of these various steps will be to increase Baltimore & Ohio interest charges in the main from $3\frac{1}{2}$ to 5 per cent. It has already been pointed out that the ease with which the new financing was carried out is a testimony to the new position in which the Baltimore & Ohio now finds itself.

Additions and Betterments

In the past several years the Baltimore has been carrying on an elaborate program for additions and betterments. This program was continued into 1924, the investment in road during the year having been increased in the amount of \$11,178,734 and the investment in equipment \$9,564,933, or a total, following certain adjustments, of \$20,684,075, the largest amount so appropriated by the Baltimore & Ohio for a period of ten years with the exception of two years in which there were unusually large acquisitions of equipment, namely, in 1923, and when the road received its allocations of the U. S. R. A. standard equipment. The most important item in the increase in road in 1924 was the construction of a new 3,800,000 bushel grain elevator at Locust Point, Baltimore, Md., which was described in the *Railway Age* of April 14, 1923. During the year the company received 73 locomotives, 55 passenger cars and 3,386 freight train cars. The foregoing figures do not include the important project embodied in the electrification of the Staten Island Rapid Transit. This project, inclusive of the equipment, will cost about \$5,000,000. It includes the electrical operation of 16.9 miles of line. Part of the electric service was started on June 5 and the formal opening of the complete project took place on Thursday. It is described elsewhere in this issue.

The Baltimore & Ohio report for May and the five months ended May 31 was given out on Saturday last. It shows results approximately the same as for the first five months of 1924, although the slight changes shown appear generally on the decrease side. Thus, the total operating revenues show a decrease of \$2,655,935, and total operating expenses a decrease of \$2,806,641. The net railway operating income for the first five months of 1925 was \$12,379,808, as compared with \$12,624,811 in the first five months of 1924, a decrease of \$245,003.

BALTIMORE & OHIO

Comparison of Selected Operating Statistics, 1920 to 1924.

Unit	1920	1921	1922	1923	1924
Average mileage operated.....	5,154	5,185	5,235	5,212	5,207
Net ton-miles, millions.....	21,663	14,998	15,775	21,842	18,597
Car miles per day.....	24.4	21.6	20.3	28.4	25.0
Net tons per loaded car.....	34.9	31.7	30.2	31.3	30.0
Per cent loaded to total car miles.....	66.1	59.9	66.8	65.1	64.3
Net ton-miles per car day.....	562	410	409	578	483
Freight cars per train.....	40.2	40.7	40.6	42.2	44.2
Gross tons per train.....	1,711	1,557	1,597	1,679	1,721
Net tons per train.....	903	753	798	840	833
Train speed (miles per train hour).....	8.7	10.4	9.4	9.3	10.0
Net ton-miles per train hour.....	7,874	7,817	7,536	7,782	8,339
Lb. coal per 1000 gro. ton-miles.....	225	218	198-190*	188	176
Loco. miles per loco. day.....	62.2	48.5	49.3	67.8	58.6
Per cent frt. locos. unserv.....	19.0	26.8	34.0	16.9	22.0
Per cent freight cars unserv.....	6.5	10.9	13.5	6.2	10.6

*Method of reporting changed.

bonds totaling \$75,000,000 and the Southwestern Division bonds totaling about \$45,000,000, both of which matured on July 1. The Schuylkill River East Side bonds of \$5,000,000 matured on June 1, and the Pittsburgh Junction & Middle Division bonds which totaled \$6,000,000, will mature on November 1.

In June, 1924, the company sold \$35,000,000 refunding and general mortgage, series C, 6 per cent bonds, \$30,000,000 of which was used to cover expenditures for additions and betterments previously made, and \$5,000,000 to assist in meeting the maturities. In August, 1924, the company sold \$75,000,000 first mortgage 5 per cent bonds for the purpose of retiring the prior lien $3\frac{1}{2}$'s and by the end of the year \$51,000,000 of the latter had already



A Santa Fe Train Descending Western Slope of the Sierras Into Los Angeles

Inspecting and Testing Materials*

*Facilities for this purpose essential to correct
railway purchasing*

By J. O. Meyer

Chemist, Great Northern, St. Paul, Minn.

WHEN the head of a department issues a requisition for the purchase of material, the purchasing agent orders it with the understanding that the material will meet the requirements. The head of the department using the material wants to know if the material is suitable for the purpose ordered and the purchasing officer wants to know if he is getting the material he is paying for. This calls for an organization which is capable of conducting the desired tests.

In babbitt metal is an illustration of the importance of inspection. Experience has shown that a babbitt metal having a composition of 5 to 7 per cent of tin, 13 to 15 per cent of antimony and the remainder lead, makes a bearing which gives satisfactory service. If the babbitt metal contains too much lead the metal will be too soft and consequently will tend to squeeze out, especially when the bearing becomes warm. If too much antimony is contained in the babbitt metal, it will be too hard and brittle and will be liable to crack and break out in pieces.

Probably the material purchased in the greatest quantity is steel. The word steel has an indefinite meaning as it embraces mild steel, medium steel, high carbon steel and alloy steels of various compositions, each of which has different properties and uses. Thus a tool for cutting should not be made from a mild or medium carbon steel, nor a rail from mild or tool steel. Likewise a high carbon or spring steel would be absolutely unfit and dangerous to use as firebox, boiler shell or flue steel.

The amount of carbon in the combined form as it is found in steel, is the element which usually decides for what purposes the steel is suitable. Carbon in a carbon steel is the strength giving element. The hardness of a steel is dependent to a large extent on the amount of carbon as well as the brittleness.

Phosphorus is an impurity in steel. The smaller the amount present the better is the steel. Sulphur is also an impurity in steel. Steel in the molten condition takes up sulphur from the fuel used, therefore fuel low in sulphur content is desirable.

The element of manganese is added to steel in certain quantities to lower the sulphur content and reduce the oxides.

The general tendency of manganese is to increase the tensile strength and reduce the ductility. On this account the manganese content in the ordinary steels is kept below one per cent. Boiler and mild steel should contain not more than one-half per cent, axle, tire and forging steels not over 0.7 per cent. Rail steel may contain from 8 to 10 per cent manganese. Above one per cent manganese, steels begin to get brittle up to seven per cent of manganese. With from 7 up to 20 per cent of manganese, steels are again malleable and possess extraordinary strength and toughness. Steels containing more than one per cent manganese would be classed under the head of special steels.

Silicon is present usually in small quantities in all steels.

Silicon has the property of increasing the wearing property of steel. It is usually allowed up to about one-quarter of one per cent in tires and rails both of which are subjected to a great amount of wear.

The elements nickel, chromium, vanadium, titanium, tungsten, molybdenum, cobalt, etc., are alloyed with steel to bring out certain characteristic properties which are desired and which cannot be obtained with exclusively carbon steel. For instance, stainless steel is steel alloyed with about 13 to 15 per cent of chromium, while self hardening steels are alloyed with varying percentages of tungsten up to about 30 per cent, together, sometimes, with smaller amounts of other elements.

The chemical composition of a steel is important but the fact that the chemical composition is satisfactory does not mean that the steel is satisfactory. It must also have certain physical properties. The physical properties of a steel can be ruined by improper handling, manufacture and subsequent working.

The physical properties usually specified are the yield point and ultimate strength, expressed in pounds per square inch, the per cent reduction in area, the per cent elongation in a certain number of inches, together with bend and nick tests.

In late years the heat treatment of steels has been brought to a high degree of efficiency. By proper heat treatment the physical properties can be greatly improved and by improper heat treatment a steel will be ruined. Proper heat treatment refines the grain. The heat treatment of steel has brought forward another line of inspection, that of examining a properly polished and etched section under a high powdered microscope in order to determine the structure of the steel.

Iron Should be Tested

Iron is another product which is purchased in large quantities. While iron is the base of both iron and steel products there is a vast difference in the structure. Steel is crystalline while good quality iron is fibrous. The best commercial grade is staybolt iron which is made from all-new material and is double refined and long fibered. Engine bolt iron should be made from all-new material but is not as highly refined as staybolt iron. Merchant bar iron is common iron made from scrap iron welded and forged or rolled. Merchant bar iron is much shorter in fiber than staybolt or engine bolt iron and is usually partly crystalline in structure, the greater part being fibrous.

Iron is inspected in the same manner as steel, as to physical properties. The greater the elongation and reduction in area of an iron the better the quality. Merchant bar iron would not serve either as engine bolt or staybolt iron because it could not withstand the torture to which these irons are subjected. Staybolt iron, of course, would be suitable to use as engine bolt or merchant bar iron but there is no economy in using an expensive article where a less expensive product is suitable.

* From a paper presented before the annual convention of the Great Northern Stores Association, June 20, 1925.

The iron, therefore, is tested to find if it is suitable for the purpose ordered.

Oil Troubles Often Begin at Home

A large amount of time in the laboratory is consumed in testing gasoline, kerosene, long time burning oils, lubricating oils, valve oil, car oil and fuel oil. Gasoline is tested for gravity and distillation points. Kerosene is tested for gravity, flash, fire and distillation, which tests are also made on long time burning oil which is also subjected to a burning test in a lantern to see if the oil will give satisfactory service. Lubricating oils and valve oils are tested for gravity, flash, fire viscosity and sometimes tarry matter and cold tests are made.

Many complaints, when traced, disclose that someone has shipped a highly refined illuminating oil in a dirty container. We have found instances where long time burning oil was handled in containers which once had held paint or varnish. A fraction of one per cent of paint or varnish oil in a highly refined illuminating oil makes the oil useless for illuminating purposes as it soon causes the wick to crust up and the flame to diminish in size. We have had instances where lubricating oils were contaminated with paint or varnish oils. This makes them unfit for lubricating purposes. Signal oil has often been spoiled by shipping it in galvanized containers. Signal oil also deteriorates with age, that is, it becomes rancid.

Supplies of signal oil should not be kept on hand very long. It is better to use all the signal oil in a can before refilling. Signal oil should also be kept in a cool place and free from contact with water. Kerosene hand lanterns have been improved to such an extent that it is probable signal oil will be discontinued for use in hand lanterns and long time burning oil substituted in the near future.

Fuel oil as used for shops and locomotives is the cheapest kind of oil. It may consist of residues from the oil stills or it may be crude oil from the earth. A cargo of fuel oil usually amounts to from 65,000 to 70,000 bbl., there being 42 gal. to the bbl. During the first year of fuel oil inspection on the Great Northern, the reclaims on fuel oil amounted to over \$53,000. Reclaims for 1923 and 1924 were only about \$13,600 and \$10,900 respectively.

Testing laboratories are called on quite frequently to make analyses of boiler compounds, coal, car cleaners and various other articles which may come up from time to time. There are also physical inspections and tests to be made on articles such as rail anchors, tie plates, rail joints, nut locks, brake beams, cements and other articles which are submitted at different times.

The scope of the railway laboratories' functions is thus large. But they are important to the railroad that insists upon getting full value for every expenditure made for all the varied material and supplies required for its operations.

THE INTERSTATE COMMERCE COMMISSION on June 25 ruled that the proposal of various western carriers to increase their rates on grain and grain products from Minneapolis, Minn., Duluth, Chicago and Peoria, Ill., and from intermediate territory between these points and Mississippi river cities to destinations in Colorado, Kansas, Missouri, Nebraska, Omaha and Wyoming, is not justified and schedules naming the increased rates were ordered cancelled by July 27. The commission also held as unjustified the proposal of the roads to increase rates on grain and grain products from points in Indiana, Illinois and Michigan, to Aurora, Ohio, Garrettsville and Mantau, and ordered schedules naming increased rates cancelled by July 28.

Canadian Senate Seeks to Combine C. P. R. and C. N. R.

A COMMITTEE of the Canadian Senate appointed to examine into the railway situation of the Dominion has published its report recommending the consolidation of the Canadian Pacific and the Canadian National.

The Senate voted as it adjourned to recommend the committee's findings to the serious attention of the Canadian cabinet.

The committee held its meetings *in camera*. No shorthand reports were taken of testimony and witnesses besides the chief executives of the two railways were restricted to a few prominent business men of the committee's selection. The report was submitted by Senator W. B. Ross. It advocated "the merging of the two railway systems for purposes of administration and operation" and:

That both the Canadian Pacific and the Canadian National should be placed under the management of a board of fifteen directors, five to be named by the Canadian Pacific, five to be named by the government, and these ten to choose five proven, capable business men to complete the board; these last five directors to hold office for ten years and to be removed only for cause. That a recapitalization be made of the Canadian National from the point of view of earning capacity.

That the Canadian Pacific be guaranteed an agreed dividend on its stock.

In the event of the joint management producing a surplus, a dividend at the same rate as is paid to the Canadian Pacific be paid to the government on the capitalization placed on the government railways. After the payment of these dividends any surplus earnings available for distribution be divided between the Canadian Pacific and the Canadian National, in proportion to the valuation of the two systems.

The report continues:

Various witnesses emphasized the waste of effort and money on competitive immigration practice, urging consolidation of effort in this connection. Three agencies are at work to secure immigration into the Dominion, viz: the Dominion government, the Canadian National and the Canadian Pacific. Each of them maintains independent organizations, and their competition entails heavy expense; an expense which could be materially reduced by a unified system which would, at lessened cost, secure better results.

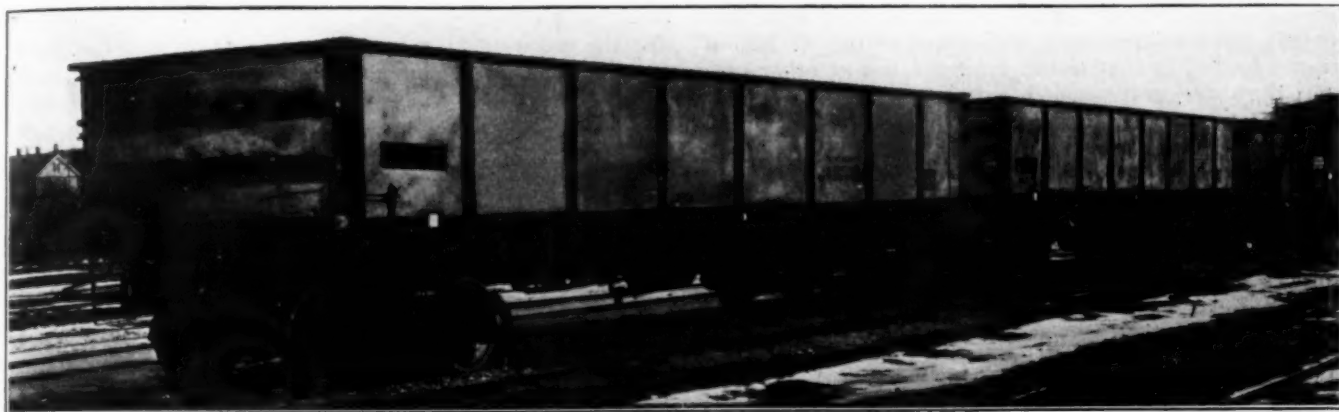
It was also stated to the committee that no inconsiderable part of the expenditure of the Canadian railways is attaining no other end than dividing existing traffic.

Your committee is of opinion that unless energetic means be adopted to reduce our national debt and the income tax, as is rapidly being done in the United States, we will be unable to command the foreign capital absolutely necessary for the development of our natural resources.

The merging of the two railway systems for purposes of operation and administration as above will remove or dispense with duplication in railway tracks and rolling stock, in passenger and freight services, in railway stations from the Atlantic to the Pacific, in telegraph, express, and other services, in offices, in accounting and bookkeeping, in numerous other special offices and staffs, in administration boards, etc., etc., and thereby and otherwise save an enormous amount of money to the country.

An echo of the report reached the House of Commons on Friday of last week, the last day of the session. W. F. Maclean, one of the Toronto members, asked the government if members of the House would be supplied with copies of the report, and Mr. Meighen, Conservative leader in the House, had the following pertinent comment to make:

"I observe that the Senate Committee which is supposed to be making this report—the origin of which would be very interesting—met in secret. I would suggest that the government see to it that if there is any report the evidence in support of it should be published, too. I hope my words will reach the Senate."



Exterior of Two Converted Gondolas with Reinforced Concrete Bodies

The Development of the Reinforced Concrete Car

Experience of past six years points way towards the successful use of new materials in car construction

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TO limit one's conception of concrete to the usual heavy, brittle, rock-like material weighing 144 lb. per cu. ft. such as is often used in heavy foundations, is to ignore both the basis of thought behind the development of the reinforced concrete railroad car and



Interior View of Original Demonstration Car—Taken at the Time of Cement Gun Repairs Following Six Years' Service

the revolutionary progress which in general has been made in concretes for special uses. These developments in new concretes not only open the field to light weight construction, but offer increased resiliency and other physical properties entirely in keeping with the necessities of the case, to say nothing of manifold advantages over the usual materials of car construction.

In order to give a clear conception of the fundamental ideas underlying the application of reinforced concrete to car construction, let the reader picture to himself an ordinary composite gondola car, for example, having trussed

steel frames on the sides, with the usual vertical and diagonal members, sheathed all around on the inside with wood planking protecting the steel somewhat from the contents. Let him now picture the following transformation: the side trusses gradually shrinking into a mere network of light steel mesh, and the wood sheathing becoming workable like poured concrete, and surrounding the steel mesh and then gradually hardening into a strong impervious special concrete with the steel embedded in its center. The result is the reinforced concrete car. The steel frame is still there to take the heavy stresses, but it has been reduced to the form of a net-work of steel. The steel net-work is inside the concrete and is thus given real protection, not only from the car contents but from the elements. The great disadvantage of the tendency of steel to deteriorate is thus overcome. The concrete itself becomes the sheathing and the steel is inside the sheathing. Assuming that the concrete used is not only resilient and suitable as sheathing, but also fire-proof and durable, which wood is not, and that the whole transformation is practicable and economical, we then catch a glimpse of the fundamental thoughts underlying the reinforced concrete car, and some of its advantages.

Progress of the Development

The development of the reinforced concrete car originated with Joseph B. Strauss, consulting engineer and president of the Strauss Bascule Bridge Company, Chicago, and dates back to the year 1907.

The basis of the original thought on the subject was the unsatisfactory nature of the materials then in use, namely, steel and wood or a combination of the two, and the belief that more satisfactory materials as regards strength, durability, cost, etc., were needed. Patents were issued in 1909.

A few years later the world war with its extraordinary

demands on both the steel industry and transportation facilities looked as if it would force the use of other materials than steel and wood in car construction. Foreign countries even began extending reinforced concrete construction to barges and small ships. Later the United States Shipping Board, faced with a desperate situation in regard to the scarcity of materials suitable for the construction of sea-going ships, finally turned to reinforced concrete. Mr. Strauss' initial patents of ten years previous embraced the use of this material in railroad car construction and thus under war pressure, plans were rushed through for the construction of the first reinforced concrete railroad car ever built.

The original concrete demonstration car was described on page 776 of the March 21, 1919, *Railway Age*.

This car took the form of a solid bottom gondola. There were no precedents to go by, no scientific basis for calculations or design. What was not known had to be guessed at. The idea was ridiculed, and the material and construction situation was almost hopeless. Nevertheless, despite upsets and difficulties without number, the car was finally completed by February, 1919.

Details of Original Demonstration Car

Completed and placed on rails	February 15, 1919
Type	Solid bottom gondola
Capacity (load)	50 tons
Capacity (volumetric)	1,800 cu. ft.
Width of body (outside)	9 ft. 8 in.
Length of body (outside)	41 ft. 6½ in.
Height of body (inside)	4 ft. 8 in.

This car came about as near being an all-reinforced-concrete car as it was possible to make it. Ordinary rod reinforcing was used, and even the cross-bearers were of reinforced concrete. The center sills and bolsters, however, were of steel. The body was of concrete, edged with steel, and reinforced with diagonal and longitudinal rods of various sizes from 3/16 in. to 3/8 in. in diameter,



Old Steel Cars as Received for Conversion to Concrete—Notice Kinks in Chord Angles, Distortion of Ends, Deterioration of Plates and Condition of Floor Members

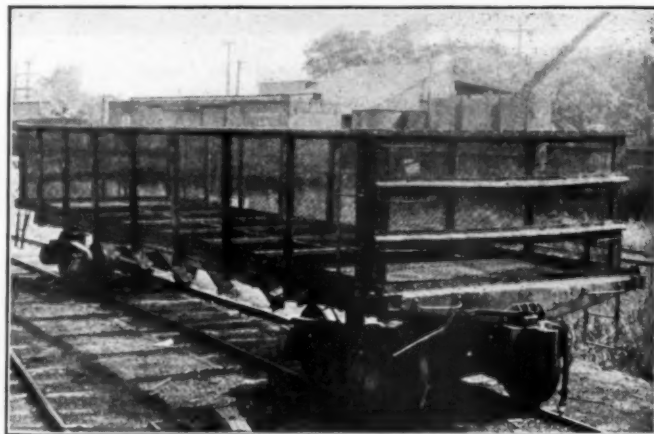
spaced from 4 in. to 8 in. on centers. Inside stakes were used, integral with the body walls. The floor was of concrete reinforced with rods. The concrete used weighed about 16 per cent less than ordinary sand and gravel concrete, the finished weight of the car being 53,600 lb.

Performance of Original Demonstration Car

In some quarters the car was received with much skepticism and doubt. One engineer, when the use of this car in coal service was under discussion, expressed the opinion that he thought it might do for soft-coal service, provided the coal was *very soft*. Another insisted

that the car would not last 30 days, and after it had survived this period of service, generously extended its lease of life to 90 days. This was over 6 years ago and this same car is still in service. On the other hand, it must in justice be said that the development enjoyed the confidence, encouragement and support of a great many others from its very inception.

After completion, the car was given a preliminary try-out of 30 days in the yards about Chicago, after which it was dedicated and placed for 30 days of test service in the coal carrying trade. After this it was loaded with steel rails and put through its second 30-day test period



Old Steel Car in Process of Conversion to Concrete—Plates Removed, Reinforcing Attached

of service under the direction of the United States Railroad Administration. On June 17, 1919, it reached Washington, D. C., after a total service of over 5,000 miles in 90 days, during which time it carried full cargoes of coal, steel rails and billets, experienced every variety of railroad service, bulk loading, clam shell and car dumper unloading, and endured every test of use and abuse, including side swiping, collision test, etc.

It was then inspected by the United States Railroad Administration and the Bureau of Standards at Washington, after which it was again placed in service, this time in the coal and iron trade.

This extensive usage, crowding the equivalent of almost a year's service into a few months, clearly demonstrated the soundness of the underlying principles on which the car was based and laid a firm foundation for further successful development.

A record of the tests of this car include the following:

Collision Test—No damage to the concrete car; the composite car struck was damaged.

Impact Test—4,400-lb. clam-shell bucket dropped 18 to 20 ft., and the blow repeated many times. The concrete on the under side of the floor cracked where the bucket fell. It was patched on spot by ordinary methods in a short time. Engineers witnessing this test expressed the opinion that similar treatment would have severely damaged or even destroyed a wood or steel floor.

End Wall Test—Steel rails sliding forward, one rail went through one end of the car making a hole in the concrete but leaving the reinforcement intact. It was patched on spot by ordinary methods in a short time. Belief was again expressed that the damage was slight in comparison with that which wood or steel would have shown.

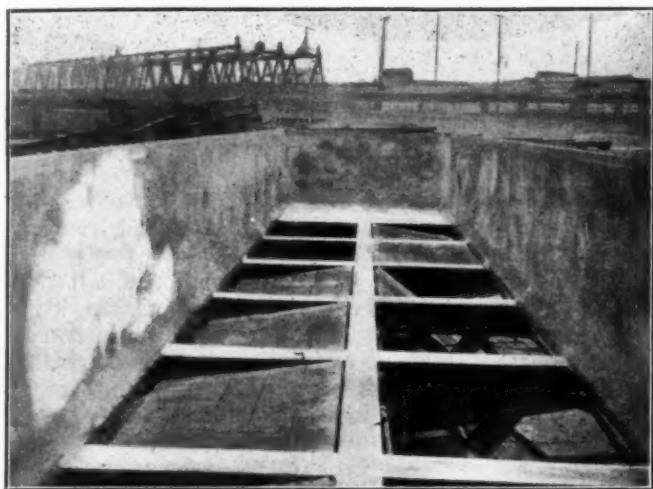
Billet and Rail Loading Test—Billets and rails were loaded by the usual methods, being dropped into the car from varying heights. No effect was detected.

Clam-Shell Unloading Test—Two of the internal stakes on one side of the car, and the transverse rib on the end were abraded from the blow of a 4,400-lb. clam-shell bucket. These were not repaired, the damage being slight. Considering that the ribs are wholly inside the car, the damage done was less than expected.

Car Unloader Test—The car was passed through an unloader with a full load; it was tilted back with one-half load and unloaded. This was repeated three times, and no effect detected.

Distortion Test—The car was jacked up at one end 12 in. and no effect detected.

Service Test—In addition to the above the car passed through all the heavy duty service of 90-days' constant



Interior View of Old Steel Car After Conversion—Doors Shown Are Temporary Wooden Doors

operation over various roads, and reached Washington in exactly the same condition, except for the patches noted, as when it started its career. Its lines were unchanged, its ends were still square and the concrete was smooth and intact as shown by the report of the Bureau of Standards. The car was not designed for either clam-shell unloading or for the car dumper unloading above noted. Considering this and conditions under which it was constructed and the fact that it was accidentally built with a kink in the top chords (inducing secondary stresses not intended or provided for) the record of this initial performance is certainly remarkable.

Original Demonstration Car Served Its Purpose

The demonstration car, as was to be expected, was not perfect. For example, the floor design was somewhat light and the same applied to the ends. After five years of use the floor and ends were allowed to get into rather bad shape, affording in 1924 the opportunity of seeing what could be done with repairs. These repairs were effected without difficulty, portions of the floor, ends, and even the internal stakes, being restored by the use of a cement gum practically without the aid of form work. One of the accompanying illustrations shows an interior view of this car as repaired.

Other technical points which demanded alteration might be mentioned; for example, the internal stakes, which it was decided to try out first as one of several alternate designs because of better appearance.

In addition to this, the car was excessive in weight. This was due partly to the use of heavy concrete cross bearers, for example, and partly to the concrete mixture used at that time.

The important thing to realize is that all these difficulties are matters of detail which have been largely overcome by proper design and studies of what is actually required. One thing is certain: if the demonstration car had never been built, we would not now be discussing fine points of design of reinforced concrete railroad cars. We would still be wondering if such cars are possible.

Thus the demonstration car has served its purpose, and accomplished its mission. Its contributions to the development of the reinforced concrete railroad car include the following:

1—It represented the first actual construction of a reinforced concrete car.

2—It furnished something tangible to criticise, correct and build upon.

3—It proved the practicability of the underlying idea of the reinforced concrete car.

4—It proved that such a car would not "shatter to pieces," just as concrete ships proved this point.

5—It pointed out many advantages which can be realized in getting away from wood and steel construction.

6—It laid the groundwork for the technology of reinforced concrete car design and construction.

7—It represented the first step toward overcoming the prejudice against the novelty of the idea.

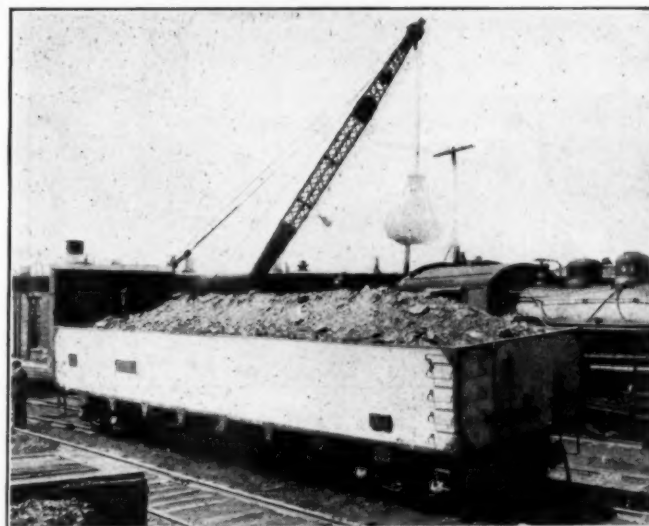
8—In the very changes it showed were necessary, it pointed the way toward technical progress.

9—It stimulated the development of light weight concrete and indicated the requirements of the other physical properties of a correct material.

10—It has permitted full advantage to be taken of the knowledge gained from thorough tests in service.

Conversion of Wood and Steel Cars to Concrete

In order to test out the feasibility of converting cars with worn-out bodies to cars with new reinforced con-



Exterior of the Original Demonstration Car Which Was Built in 1919

crete bodies, and in general to further the development, conversion plans were worked for several types of cars.

The process of conversion as it was applied to two steel cars in 1924 may be briefly described as follows. The cars as received were worn out, all-steel gondolas, drop bottom type, of 50 tons capacity each. They were both badly deteriorated. The plates were rusted to the point where a hammer could be driven through them in spots, the chord angles were bent and damaged and the ends distorted. The cross bearers were bent out of shape and their cover plates were in a hopeless condition. The drop doors had been bolted shut with planks and the cars had apparently been used as solid bottom cars for some time.

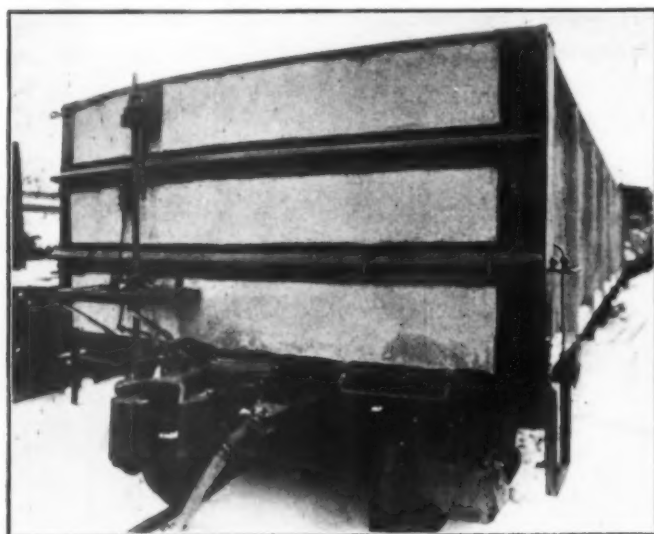
The old steel bodies were first removed, except the

original stakes were left intact. The underframe was straightened, and the worn out cover plates were altered in keeping with the conversion plans. A new light steel body frame was then added to form an edging for the concrete. Old parts which could be salvaged were used in this new framework. The reinforcing was attached to the frame and the concrete finally applied. The conversion contract did not cover the drop doors and these were simply rebuilt temporarily with heavy wooden planking to keep down expense.

Unfortunately the light weight concrete desired was not available in time for use in these cars, and as the tracks on which they were being built had to be torn up by a certain date it was found necessary to use the only aggregate at hand, which was even heavier than that used in the original demonstration car. This, coupled with certain test features which it was desired to add to these cars, resulted in considerable excess weight. Even then they weighed about two tons less apiece than the original demonstration car.

Further Aspects of the Development

In order to test out further points of design, especially the employment of outside stakes, a gondola car was designed and built in 1924, of the same general dimensions as the original demonstration car, namely, length of body



Close-up End View of 50-ton Reinforced Concrete Gondola Built in 1924

outside 41 ft. 6 in., width of body outside 9 ft. 8 in. and height of body inside 4 ft. 8 in. Although the stakes were on the outside they were made by an inward panelling of the sides, so that there is no projection beyond the steel edging of the concrete.

It is beyond the scope of this paper to discuss the details of the design in this case, but it may be said that the very conservative proportion of light weight concrete introduced in this car brought the weight, while the concrete was still green, to 44,500 lb. corresponding to a cured weight of about 44,000 lb. In as much as the use of light weight material throughout would represent a substantial reduction in weight even over this figure, there is no reason to doubt that the development offers no disadvantage and even some possible improvement in the matter of car weight.

Although the only cars built so far have been gondola cars, plans for extending the development to box cars and other types of freight cars are under way and there seems

no reason why this type of construction cannot be applied to passenger cars.

There would, of course, be no point in carrying on a development which merely aimed at doing "something different." In the last analysis an industrial development must rest on the *benefits* to be derived from the changes which it involves. In this connection let it be said that the expectations of the founders seem more than justified.

For example, the present status of the development indicates the possibility of a substantial saving in the first cost of cars built of reinforced concrete over those built of the usual materials. Moreover, economical steel and wood construction have been pushed to the limit, whereas there is every opportunity of working out still more economical production methods with reinforced concrete than those now considered.

Reinforced concrete construction offers many of the advantages of both wood and steel without their disadvantages. It overcomes the difficulty represented by the liability of steel to deteriorate. Good insulating properties can be insured by proper concrete mixtures. The concrete itself is fire-proof and it protects the steel as in modern fire-proof building construction. Moreover, it lends itself to large construction and heavy loads, which wood does not.

Other advantages might be briefly mentioned. It reduces dependence on the steel market to a minimum, it is ideal for coal, slag, cinders and hot ashes; car interiors are free from projecting rivet heads and exposed metal; cars can be built of it with drop doors, drop ends, etc., for any class of service; it is adaptable to any of the existing standards; it requires a minimum of plant layout to construct and to repair. It thus offers an opportunity not only to reduce the heavy capital expenditures for rolling stock, which the railroads are faced with making in carrying out their program for adequate transportation facilities, but also to reduce the enormous current expenditures which the railroads now find it necessary to make for car maintenance and repairs.

A Heavy Highway Car for Railroad Use

THE Versare Corporation, Albany, N. Y., has perfected a highway passenger automobile which moves on two four-wheel trucks and will seat 44 passengers with standing room for 52 more. Its drive is gas-electric. Both pairs of trucks are movable as are also, separately from the trucks, the front pair of wheels of each. The result is a highway vehicle of high capacity which, in spite of its size, can still negotiate narrow and crooked streets with ease and, which, because its weight is evenly distributed over four axles, comes well under the maximum highway loading restrictions.

The corporation does not propose to sell these vehicles to the competitors of the railways. It expects to find a market rather with the steam railroads and the street railways which, it is believed, can use the vehicle to supplement existing services. A freight truck of the same general design is being built and will be ready for test in about a month. It will carry a paying load of 15 tons, and will likewise be sold only to railways.

The present coach has eight springs which absorb the road shocks and reduce the pounding effect on the road and shocks to the body and chassis, making for longer life of the mechanism and improving riding qualities. It has an overall length of 40 ft. and is mounted on 30-in. wheels that are provided with rubber cushion tires. The

trucks have a wheel base of 54 in. The distance from center to center of trucks is 30 ft. The total weight of the vehicle is 16,000 lb. The tread is 61 in. and the body width 8 ft., the latter being the maximum allowable by law. It is possible to turn this vehicle around in a circle with a diameter only 5 feet greater than its length.

The trucks are of swivel type. The driver controls the front wheels of the forward truck by means of a steering wheel in much the same manner as the ordinary automo-



View of Coach from Right Side Showing Doors

bile and the rear truck tracks with the forward truck automatically.

Traction is secured by motors which obtain their power from a generator which is driven by a gasoline motor. The elaborate mechanism with many differentials and universal joints which would be necessary for mechanical transmission on such a large vehicle is thus avoided, as is all gear shifting. This is considered an important advantage, in view of the fact that heavy vehicles in frequent stop service requiring much shifting of gears are apt to be laid up frequently because of transmission troubles. The electric transmission also has the advantage of reducing vibration, which makes for lower maintenance costs and the smooth acceleration which makes for more comfortable riding. The engine is also used more economically.

This coach is equipped with a 100-hp. engine recently developed by the Waukesha Engine Company. This engine is a model 6-A, with 4½-in. bore and 5¾-in. stroke, constructed with the Ricardo head. This engine is connected to the generator by means of a flexible coupling and the two are mounted as a unit on channels lengthwise of the car as in ordinary automobile practice. The driver's seat is to the left of the generator that is connected to the rear of the engine.

The electrical equipment for the Versare coach was supplied by the Westinghouse Electric & Manufacturing Company. The generator is capable of utilizing the full output of the engine and is able, without overheating, to supply full power to the two motors that are mounted on

the bogies. The motors have a rating of 20 hp. at 175 volts. There are two of these, one mounted on the rear axle of each truck. They are of vehicle type, rated at 20 hp. and have a high continuous rating. They are partially enclosed to protect the commutator against dirt and water.

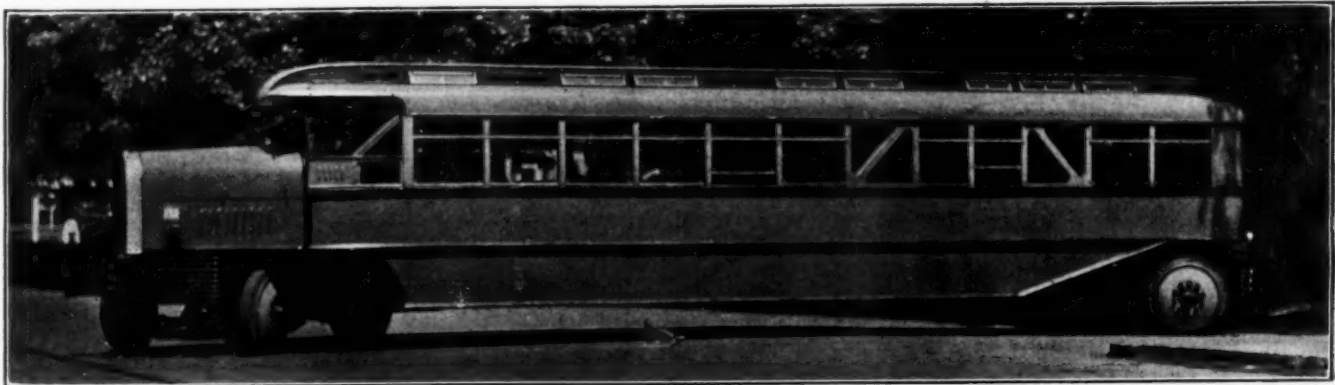
The master controller and a braking controller form the principal parts of the control apparatus. The master controller has three operating positions, series and parallel forward and parallel reverse. The parallel operating position forward is the first position from the "off" as it is used more frequently than the series. The master controller is mounted directly under the driver's seat and a lever for positioning the controller extends up through the seat to the left of the driver. A special notching device is provided on the lever that protects the control from rough handling by the driver.

The type of control is simple in operation and easily mastered. The engine is first started, of course, as in ordinary practice. The driver then throws the motor control lever into one of the operating positions. He is then ready to go. The engine throttle is practically the only control regularly used, the variations in engine speed being sufficient to produce the desired voltages and hence coach operating speeds.

The equipment is designed for a maximum speed of 30 miles per hour. The balancing speed on the level of the coach is approximately 25 miles per hour with a reasonable engine speed. No tests have as yet been made on this new coach to indicate its performance, but it is expected to be better than that of the initial experimental equipment. The experimental equipment was heavier and of slightly different construction. Tests on it indicated that scheduled speeds of 11 miles per hour could be made on mile runs with 8 stops per mile of ten seconds in length. Here the tests were conducted on a road with a rolling profile, having grades up to approximately 4 per cent. As far as possible the starts were always made up hill.

This coach is provided with three independent sets of brakes. Standard automotive Westinghouse air brakes, of the internal expanding type, are provided on all eight wheels with the usual controlling air drums. In addition to the air brakes, the hand brake is incorporated on the truck for bringing the coach to a stop or for holding it for long periods. The hand brake lever is mounted on the left of the driver. In addition to these two brakes, the electrical brakes are incorporated in the electrical scheme of control.

The air storage tanks, the electrical grid resistance and a 40-gal. gasoline tank are all mounted under the center of the coach. Air is supplied to the tank by means of a compressor directly connected to the engine. These tanks clear the side of the coach and in no way interfere with clearances needed for ordinary operation.



Coach Turning Back on a V-Shaped Street Intersection—Both Trucks Have Turned as Have Front Wheels of Each Truck

D. L. & W. Directors Review Truesdale Administration

THE board of managers of the Delaware, Lackawanna & Western have formally approved the election of John M. Davis as president and have accepted the resignation of W. H. Truesdale and approved his election as their chairman. These changes were announced in the *Railway Age* of June 13, and they became effective on July 1. In ratifying the changes the board at its meeting on June 25 drew up a statement outlining the career of the property under Mr. Truesdale's administration which reads in part as follows:

Some eighty years ago the founders of our company acquired anthracite coal lands in Pennsylvania.

In the course of their development, they built and acquired railroads over which to transport the coal to market. Practically all the coal lands were acquired, and most of the rail lines comprising our system were built or leased, prior to the year 1899.

On the second day of March of that year William Haynes Truesdale became president of the company, and has served continuously until today, when he resigned to become chairman of the board. Upon assuming charge of the Company, he proceeded vigorously to the upbuilding and development of the property, both railroad and mining. From our current earnings, which, by exceptionally efficient management, were increased yearly, large sums were expended under his personal supervision, with painstaking study and with rare intelligence and broad vision.

During his administration our main line from Hoboken to Buffalo was rock ballasted and laid with heavy rail, tie plates and screw spikes on creosoted ties, with like work on our branch lines of heavy traffic. All bridges were rebuilt of steel or concrete. One hundred eighty-one new stations and freight houses were built, including extensive reconstruction of our Hoboken and Buffalo terminals.

Block signals were installed throughout, and all important points protected by interlocking plants. Upwards of 260 grade crossings were eliminated.

New locomotive and car shops were built at East Buffalo, Scranton and Kingsland. Many miles of second, third and fourth track, including a second tunnel through Bergen Hill, were constructed with many changes of line. The most notable of the works under his administration were the new construction through our suburban zone and the new lines of railroad built in New Jersey and Pennsylvania, known as the New Jersey and Scranton cut-off lines.

Mr. Truesdale directed the same constructive policy to the installation of modern facilities for the economical production of our coal, such as steel and concrete breakers, electrification, and the most improved power plant, pumping machinery and transportation. He also directed the acquisition of new properties, including our ferry lines, New York and Brooklyn terminals, Bangor & Portland, and Erie and Central New York Railroads, bituminous coal lands and other properties.

With the exception of the Scranton cut-off line, financed by the issue of new stock at par, all such capital expenditures during his entire administration were from income, and aggregate upwards of \$182,000,000. The bonded indebtedness of the company and all its leased companies in the hands of the public is less by \$16,000,000 than it was in 1899, and totals but \$36,500,000.

Our main lines of railroad are as permanent as modern practice can make them, and our traffic density has increased between the years cited 169 per cent in passenger, and 141 per cent in freight. We haul 224 per cent more freight per train and 129 per cent more passengers.

In 1899 anthracite coal constituted 60 per cent of our freight traffic, while today it is less than 40 per cent. Of traffic other than such coal we hauled in 1899 5,500,000 tons, while in 1924 we hauled 17,000,000. For the years 1900-1904 our net railway income averaged \$3,750,000, while for the years 1920-1924 it averaged \$8,000,000. In the year 1900, \$1,834,000 was distributed to our stockholders in dividends while in the year 1924, \$11,821,754 was so distributed. In 1900 our book assets were \$50,000,000 and surplus \$15,000,000; in 1924 our book assets were \$259,000,000 and our surplus \$127,000,000.

In 1900 we had \$5,500,000 of distributable surplus; we now have \$123,000,000.

In the year 1899 the division of each dollar received by our company from transportation was 37½ cents to capital, 59½ cents to labor and materials, and 3 cents for taxes. In 1924 it was 18 cents to capital, 74 cents to labor and materials, and 8 cent for taxes. When Mr. Truesdale became president, the market value of our properties was less than \$50,000,000.

Since then \$192,000,000 in cash dividends have been declared by our company, and its railroad properties are of the market value of upwards of \$240,000,000, while the stock of the two coal companies which now operate and sell the coal we then owned has a market value of upwards of \$150,000,000 more.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading for the week ended June 20 amounted to 982,600 cars, a decrease of 4,596 cars as compared with the week before but an increase of 79,054 cars as compared with the corresponding week of last year. As compared with 1923 there was a decrease of 22,382 cars but the cumulative total for the year to date is still above that for the corresponding week of last year. As compared with 1923 last year increases were reported from all districts and in all classes of commodities except grain and grain products and livestock. Miscellaneous loading showed an increase of 46,504 cars as compared with last year and 26,128 cars as compared with 1923. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

REVENUE FREIGHT CAR LOADING

Week Ended Saturday, June 20, 1925.

Districts	1925	1924	1923
Eastern	234,459	213,278	248,197
Allegheny	201,636	187,194	226,027
Pocahontas	49,636	41,137	39,866
Southern	141,973	124,897	130,924
Northwestern	150,561	144,227	168,081
Central Western	139,935	135,558	136,213
Southwestern	64,400	57,255	55,674
Total western districts	354,896	337,040	359,968
Commodities			
Grain and grain products	35,285	36,446	33,949
Livestock	25,581	31,800	28,794
Coal	153,663	140,814	183,402
Coke	9,190	7,325	14,828
Forest products	72,017	68,172	78,089
Ore	61,657	57,305	82,035
Misc., l. c. l.	257,714	240,695	242,520
Miscellaneous	367,493	320,989	341,365
Total	982,600	903,546	1,004,982
June 13	987,196	902,592	1,008,838
June 6	994,874	910,793	1,012,312
May 30	920,514	820,551	932,684
May 23	986,209	918,224	1,015,532
Cumulative total, 25 weeks	23,306,287	22,276,901	22,984,031

The freight car surplus for the period June 7 to 14 averaged 313,494 cars, a decrease of 5,311 cars as compared with the week before. This included 117,496 coal cars and 147,794 box cars. The Canadian roads had a surplus of 37,145 cars, including 33,450 box cars.

Car Loading in Canada

Revenue car loadings at stations in Canada during the week ended June 20 showed an increase over the previous week of 1,514 cars, grain loading being heavier by 667 cars, pulpwood by 234 cars, ore by 849 cars and miscellaneous freight by 303 cars. Compared with the same week last year the total was less by 7,764 cars, grain loading accounting for 4,003 cars and coal 3,540 cars of this decrease.

Commodities	Total for Canada			Cumulative totals to date	
	June 20 1925	June 13 1925	June 21 1924	1925	1924
Grain and grain products	5,398	4,731	9,401	146,948	206,965
Livestock	1,974	2,045	2,125	54,507	54,290
Coal	1,586	1,736	5,126	91,422	120,518
Coke	201	138	166	7,019	5,994
Lumber	4,192	4,270	3,894	83,687	89,203
Pulpwood	2,221	1,987	2,450	77,717	60,689
Pulp and paper	1,992	1,972	1,911	52,000	51,700
Other forest products	2,710	2,587	2,673	73,955	70,360
Ore	1,805	1,316	1,812	31,706	28,421
Merchandise, l. c. l.	15,882	15,968	16,192	370,599	348,784
Miscellaneous	13,526	13,223	13,501	278,243	281,431
Total cars loaded	51,487	49,973	59,251	1,267,803	1,338,355
Total cars received from connections	31,644	31,134	30,211	822,818	828,392

General News Department

Motor truck freight service for l.c.l. freight is to replace the present local freight trains of the Michigan Central between Niles, Mich., and Ann Arbor. If the results of the experiment are favorable, the truck service will be extended to other parts of the Michigan Central lines.

The railroad stop law, which is being put into effect in Louisiana, requires drivers of all motor vehicles to come to a complete stop at a distance of not less than 10 ft. or more than 50 ft. from a railroad track and carries a penalty of \$50 fine and imprisonment for 30 days for violation. The law does not apply in municipalities with a population of 10,000 or more inhabitants.

Erie to Enlarge Facilities at New York for Store-Door Delivery

The Erie, which delivers l. c. l. freight in New York either at store-door or at inland freight stations, handling the freight from its cars on team tracks at Jersey City by motor truck, is planning to extend this service with the opening of the new Holland vehicular tunnels under the Hudson river and will abandon its Monmouth street yard, Jersey City, as a storage yard for coaches and will remodel it into a team track yard. A new coach yard is under construction at Weehawken, N. J., about a mile further north. The Monmouth street yard is located in the immediate vicinity of the New Jersey entrance to the new vehicular tunnels.

Chicago Suburban Fare Hearing

A hearing before the Interstate Commerce Commission to determine whether the Chicago & North Western shall be permitted to increase suburban fares 20 per cent, was held on June 30 and July 1 in Chicago. During the hearing the road produced evidence to show that the road is operating suburban service at a loss. The testimony of R. N. Van Doren, general counsel, showed that there has been an annual loss of \$1,250,000 and that commutation rates are cheaper than those for like service in New York, Boston and Philadelphia. This hearing is the first to be held on the general increase of suburban fares in Chicago. A hearing on the petition of the Chicago & North Western and 17 other roads for a 20 per cent increase in suburban rates comes up before the Illinois Commerce Commission on July 15.

Employees of Alabama, Tennessee & Northern Present President with Token

Employees and officers of the Alabama, Tennessee & Northern, the Alabama & North Western and the Mississippian presented John T. Cochrane, president, with a loving cup on the occasion of his birthday, June 24, in Mobile at a luncheon arranged by the employees as a surprise.

The luncheon and the token originated in the minds of several of the employees—not officers—of the road. The total attendance at the luncheon was 124, including 30 mechanical department employees, 27 from the transportation department, 10 from the roadway department and 35 officers and others. The presentation was made by Willard Sumner, a conductor, the oldest employee of the company in point of service.

Bus Competitor of N. Y., N. H. & H. Enjoined

The full bench of the Supreme Court of Massachusetts has enjoined against further operation a bus operator operating a line between Boston and Brockton in competition with the railroad line of the New York, New Haven & Hartford, the bus operator not having obtained permits to operate from the municipal authorities of either city. This decision affirms a decree of the Superior Court of Massachusetts. The decision holds that the

railroad "has a franchise right to transport passengers between the points named. That right carries with it heavy obligations to the public. Although that franchise right is not exclusive against other grants authorized by the Legislature, it is exclusive against one conducting competition, as is the defendant, without a franchise or license and contrary to law."

Cost of Locomotive Fuel

The cost of fuel coal to the railroads showed a further reduction in April as compared with last year and the earlier months of this year, according to the monthly statement issued by the Interstate Commerce Commission. On the other hand the cost of fuel oil showed an increase. The average cost of fuel for road locomotives in freight and passenger train service (charged to operating expenses) for Class I steam railways in April was \$2.79 a ton, as compared with \$3.19 last April and \$2.81 for four months of this year. There was also a reduction in the number of tons used and the total cost for the month was \$20,532,551. The average cost of fuel oil was 3.29 cents per gallon, as compared with 2.80 cents last April and 3.11 cents for four months. The total cost of coal and fuel oil for four months this year was \$112,885,814 as compared with \$132,244,549 for the corresponding period of last year.

Quakes at Two Points Damage Railways but Slightly

Earthquakes at Santa Barbara, Cal., and in the vicinity of Lombard, Mont., between June 27 and 29, damaged railways and interfered with operation only slightly. The Northern Pacific and Chicago, Milwaukee & St. Paul had to contend with a number of landslides which blocked both lines near Lombard, but trains were detoured with little delay and lines were opened up again within three days. The Northern Pacific was blocked two miles west of Lombard by a landslide which covered the tracks for a distance of 1,200 ft. and the St. Paul had several landslides and cave-ins in the tunnel near Lombard. Fortunately the rock which covered the tracks was of small size and easily removed.

The Southern Pacific suffered property loss of \$52,000 at Santa Barbara. The buildings damaged included a roundhouse and passenger station. The line was blocked for only a few hours and special relief trains from Los Angeles met little delay. A relief train of 2 diners fully stocked, 4 baggage cars, 100 cot beds, 7 coaches, medical supplies, 30 doctors, and 27 nurses was ready to leave Los Angeles, when it was found it was not required. The principal officers of the Southern Pacific at Los Angeles made headquarters at Santa Barbara temporarily in order to give full assistance to the stricken city. The Santa Barbara earthquake was clearly defined as a local disturbance and was not felt at San Francisco and Los Angeles which are respectively 367 and 104 miles distant.

Great Northern Cascade

Mountain Electrification Plans

The plans of the Great Northern for the extension of electric operation on its line over the Cascade Mountains for a distance of 24 miles have been completed. The new electrified line will extend from Tye, Washington, to Skykomish, as reported in the *Railway Age* of April 25.

The Great Northern has for years operated trains through its tunnel through the Cascade Mountains with electric locomotives, the power being generated in the Tumwater Canyon of the Wenatchee River on the east side of the Cascades. This operation has been expensive on account of the large investment in power plant and locomotives and small use made of the plant. The extension of the electric operation will result in considerable saving without corresponding increase in equipment and power plant because the present equipment and power plant which are not used to full capacity will be in operation more of the time and over a longer

distance. There will also be a corresponding reduction in the number of steam locomotives used.

On account of its 2.2 per cent grade, the heaviest on the Great Northern, the use of the electric locomotives will improve operating conditions over the Cascades greatly. The type of installation on the Great Northern is a combination of the direct current and alternating current systems. The combination will be effected by having on each locomotive a converter which changes the single phase 25-cycle alternating current delivered to the trolley at 11,500 volts into direct current which is in turn delivered to the motors at 600 volts. Thus the electric power delivered along the line is high voltage alternating current and that used in motors, low voltage direct current.

"Be Careful at Crossings"

In an advertisement published by the Illinois Central entitled "Be Careful at Crossings," an appeal is made to the public to aid the railroads in reducing accidents at crossings. The advertisement points out the fact that the railroads are becoming safer constantly for those who work on them and for those who ride on their trains. Reports of railway accidents were first compiled on a national basis in 1888. In that year 315 passengers and 2,070 employees were killed while in 1924, 149 passengers and 1,533 employees were killed. This is a reduction of 53 per cent in passenger fatalities and 26 per cent in employee fatalities, notwithstanding the fact that since 1888 railway passenger traffic has more than trebled; railway freight traffic has increased almost six times, and the number of railway employees has grown from about 700,000 to nearly 2,000,000.

Accidents at highway grade crossings, which are not included in the foregoing figures, have come in recent years to be the most prolific cause of fatalities on the railroads. The growing use of automobiles on the highways is the chief cause of this. However, in 1917 there were 22 fatalities in automobile accidents at grade crossings for every 100,000 automobiles in use, while in 1924 there were only 10 for every 100,000 automobiles in use. But despite this apparent progress in prevention of grade crossing accidents, the total loss of life in such accidents continues at an appalling rate. In 1890, the earliest year grade crossing accidents were reported, the number of persons killed in such accidents was 402. In 1924, thirty-four years later, it was 2,149, an increase of nearly 435 per cent.

The railroads have been endeavoring for years to prevent accidents at grade crossings. But the railroads alone cannot prevent crossing accidents. Those who cross railway tracks must be cautious for their own safety. It is within their power to protect themselves at all crossings. Without their co-operation the efforts of the railroads are wasted.

Canadian Earnings in May

In the month of May the Canadian Pacific suffered another decline in the monthly net, when compared with 1924, making the fourth this year to date. For the 5-month period ended with May net earnings of the Canadian Pacific show a decrease of nearly \$1,750,000, when compared with the same period of 1924. Gross earnings are lower by \$7,750,000, while operating expenses decreased slightly over \$6,000,000. Gross earnings, operating expenses and net for the month of May this year, compare as follows with those of the corresponding month of last year:

	May	1925	1924	Decrease
Gross		\$12,467,612	\$14,426,679	\$1,959,066
Operating exp.....		11,558,698	12,700,209	1,141,511
Net earnings		\$908,913	\$1,726,469	\$817,555
Five months ending May:				
Gross earnings		\$61,691,172	\$69,521,283	\$7,830,111
Operating exp.....		55,477,977	61,590,848	6,112,871
Net earnings		\$6,213,195	\$7,930,435	\$1,717,239

Following are the gross and net earnings for each month back to the beginning of the year:

	1925—	Gross	Net
May		\$12,467,612	\$908,913
April		12,608,788	1,448,599
March		12,931,546	2,117,212
February		11,786,710	1,154,700
January		11,896,513	583,768

Operating results of the Canadian National for May this year show a decrease in gross earnings of \$1,105,032, or 5 per cent, as compared with May, 1924. Operating expenses decreased

\$1,760,295, or 9 per cent, and net earnings were \$399,940, as compared with a deficit of \$255,323 in May, 1924. The aggregate gross earnings for the 5 months of this year show a decline of \$7,845,410, or 8.2 per cent, as compared with the same period last year. Operating expenses in that time were reduced by \$8,484,319, or 9.2 per cent, and net earnings were \$4,174,722, an increase of \$618,909, or 17.4 per cent, over the first five months of 1924. Gross earnings, operating expenses and net earnings for the month of May and for the five months were:

	May	1925	1924	Change
Gross		\$18,245,738	\$19,350,770	*\$1,105,032
Operating exp.....		17,845,798	19,606,093	*1,760,295
Net		\$399,940	-\$255,323	†\$655,263
Five months:				
Gross		\$87,339,081	\$95,184,491	*\$7,845,410
Operating exp.....		83,164,359	91,628,678	*8,464,319
Net		\$4,174,722	\$3,555,813	†\$618,909

*Decrease. †Deficit. ‡Improvement. §Increase.

Meetings and Conventions

The following list gives names of secretaries, dates of next or regular meetings and places of meetings.

- AIR BRAKE ASSOCIATION.**—F. M. Nellis, 165 Broadway, New York City. Next convention, 1926, New Orleans, La. Exhibit by Air Brake Appliance Association.
- AIR BRAKE APPLIANCE ASSOCIATION.**—John B. Wright, Westinghouse Air Brake Co. Meeting with Air Brake Association.
- AMERICAN ASSOCIATION OF ENGINEERS.**—C. E. Drayer, 63 E. Adams St., Chicago. Next convention, 1925, Orlando, Fla.
- AMERICAN ASSOCIATION OF FREIGHT TRAFFIC OFFICERS.**—Grant Williams, 1341 Railway Exchange, Chicago.
- AMERICAN ASSOCIATION OF GENERAL BAGGAGE AGENTS.**—E. L. Duncan, 332 So. Michigan Ave., Chicago.
- AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.**—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, October, 1925, New Orleans, La.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.**—J. Rothschild, Room 400, Union Station, St. Louis, Mo. Next convention, 1926, Montreal, Quebec, Canada.
- AMERICAN ASSOCIATION OF SUPERINTENDENTS OF DINING CARS.**—C. H. Shircliffe, Chicago & North Western Ry., Chicago. Annual meeting, October 6, Hotel Statler, St. Louis, Mo.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.**—J. W. Welsh, 292 Madison Ave., New York. Annual convention, October 5-9, 1925, Atlantic City, N. J.
- AMERICAN RAILROAD MASTER TINNERS', COPPERSMITHS' AND PIPE FITTERS' ASSOCIATION.**—C. Borchardt, 202 North Hamilton Ave., Chicago, Ill.
- AMERICAN RAILWAY ASSOCIATION.**—H. J. Forster, 30 Vesey St., New York, N. Y.
- Division I.—Operating.**—J. C. Caviston, 30 Vesey St., New York. Freight Station Section (including former activities of American Association of Freight Agents).—R. O. Wells, Freight Agent, Illinois Central Railroad, Chicago, Ill.
- Medical and Surgical Section.**—J. C. Caviston, 30 Vesey St., New York.
- Protective Section** (including former activities of the American Railway Chief Special Agents and Chiefs of Police Association).—J. C. Caviston, 30 Vesey St., New York, N. Y. Next meeting, July 8-10, Auditorium Hotel, Chicago.
- Safety Section.**—J. C. Caviston, 30 Vesey St., New York.
- Telegraph and Telephone Section** (including former activities of the Association of Railroad Telegraph Superintendents).—W. A. Fairbanks, 30 Vesey St., New York. Next meeting, October 20-22, 1925, New Orleans, La.
- Division II.—Transportation** (including former activities of the Association of Transportation and Car Accounting Officers).—G. W. Covert, 431 South Dearborn St., Chicago, Ill.
- Division III.—Traffic.**—J. Gottschalk, 143 Liberty St., New York.
- Division IV.—Engineering.**—E. H. Fritch, 431 South Dearborn St., Chicago, Ill. Exhibit by National Railway Appliances Association.
- Construction and Maintenance Section.**—E. H. Fritch.
- Electric Section.**—E. H. Fritch.
- Signal Section** (including former activities of the Railway Signal Association).—H. S. Balliet, 30 Vesey St., New York, N. Y. Next meeting, Sept. 29 to Oct. 1, West Baden Springs, Ind.
- Division V.—Mechanical** (including former activities of the Master Car Builders' Association and the American Railway Master Mechanics' Association).—V. R. Hawthorne, 431 South Dearborn St., Chicago, Ill. Exhibit by Railway Supply Manufacturers' Association.
- Equipment Painting Section** (including former activities of the Master Car and Locomotive Painters' Association).—V. R. Hawthorne, 431 South Dearborn St., Chicago, Ill. Next meeting, September 15-17, 1925, St. Paul, Minn.
- Division VI.—Purchases and Stores** (including former activities of the Railway Storekeepers' Association).—W. J. Farrell, 30 Vesey St., New York, N. Y.
- Division VII.—Freight Claims** (including former activities of the Freight Claim Association).—Lewis Pilcher, 431 South Dearborn St., Chicago, Ill.
- Car Service Division.**—C. A. Buch, 17th and H Sts., N. W., Washington, D. C.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.**—C. A. Lichty, C. & N. W. Ry., 319 N. Waller Ave., Chicago. Next convention, October 20-22, 1925, Buffalo, N. Y. Exhibit by Bridge and Building Supply Men's Association.
- AMERICAN RAILWAY DEVELOPMENT ASSOCIATION.**—A. L. Moorshead, Industrial Engineer, Erie K. R., New York, N. Y.
- AMERICAN RAILWAY ENGINEERING ASSOCIATION.**—(Works in co-operation with the American Railway Association Division IV.) E. H. Fritch,

- 431 South Dearborn St., Chicago. Exhibit by National Railway Appliances Association.
- AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—(See American Railway Association, Division V.)
- AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—G. G. Macina, C. M. & St. P. Ry., 11402 Calumet Ave., Chicago. Annual convention, September 2-4, 1925, Hotel Sherman, Chicago. Exhibit by Supply Association of the American Railway Tool Foremen's Association.
- AMERICAN SHORT LINE RAILROAD ASSOCIATION.—T. F. Whittelsey, 1319-21 F St., N. W., Washington, D. C.
- AMERICAN SOCIETY FOR STEEL TREATING.—W. H. Eisenman, 4600 Prospect Ave., Cleveland, Ohio. Annual convention, week of September 14, 1925, Cleveland, Ohio.
- AMERICAN SOCIETY FOR TESTING MATERIALS.—C. L. Warwick, 1315 Spruce St., Philadelphia, Pa.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—29 W. 39th St., New York. Regular meetings 1st and 3rd Wednesday in month, except July and August, 33 W. 39th St., New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Railroad Division, A. F. Stuebing, Chief Engineer, Bradford Draft Gear Co., 23 W. 43rd St., New York.
- AMERICAN TRAIN DISPATCHERS' ASSOCIATION.—C. L. Darling, 10 East Huron St., Chicago, Ill. Biennial convention, July 20, 1925, Chicago.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.—E. J. Stocking, 111 West Washington St., Chicago. Next convention, January 26-28, 1926, Cleveland, Ohio.
- ASSOCIATION OF RAILWAY CLAIM AGENTS.—H. D. Morris, District Claim Agent, Northern Pacific Ry., St. Paul, Minn. Annual meeting, May, 1926, Los Angeles, Calif.
- ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Annual meeting, October 27-30, Hotel Sherman, Chicago. Exhibit by Railway Electrical Supply Manufacturers' Association.
- ASSOCIATION OF RAILWAY EXECUTIVES.—Stanley J. Strong, 17th and H Sts., N. W., Washington, D. C.
- ASSOCIATION OF RAILWAY SUPPLY MEN.—E. E. Thulin, Peoples Gas Bldg., Chicago. Meeting with International Railway General Foremen's Association.
- ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—(See American Railway Association, Division I.)
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—(See American Railway Association, Division II.)
- BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—B. J. Wilson, Pocket List of Railroad Officials, 1428 Lytton Bldg., Chicago. Meeting with American Railway Bridge and Building Association.
- CANADIAN RAILWAY CLUB.—C. R. Crook, 129 Charron St., Montreal, Que.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 626 North Pine Ave., Chicago. Regular meetings, 2nd Monday in month, except June, July and August, Great Northern Hotel, Chicago.
- CAR FOREMEN'S ASSOCIATION OF LOS ANGELES.—J. W. Krause, 514 East Eighth Street, Los Angeles, Calif. Regular meetings, second Friday of each month, 514 East Eighth Street, Los Angeles.
- CAR FOREMEN'S ASSOCIATION OF ST. LOUIS, MO.—R. E. Giger, 721 North 23rd St., East St. Louis, Ill. Meetings, first Tuesday in month at the American Hotel Annex, St. Louis.
- CENTRAL RAILWAY CLUB.—Harry D. Vought, 26 Cortlandt St., New York. Regular meetings, 2nd Thursday, January to November. Interim meetings, 2nd Thursday, February, April, June, Hotel Statler, Buffalo, N. Y.
- CHICAGO CLAIM CONFERENCE, Personal Injury Section.—F. L. Johnson, Chicago & Alton R. R., 340 Harrison St., Chicago. Meets 12:30 p. m., first Monday each month, Sherman Hotel, Chicago.
- CHIEF INTERCHANGE CAR INSPECTORS' AND CAR FOREMEN'S ASSOCIATION.—A. S. Sternberg, Belt Ry. of Chicago, Polk and Dearborn Sts., Chicago. Annual convention, September 22-24, Hotel Sherman, Chicago.
- CHIEF INTERCHANGE CAR INSPECTORS' AND CAR FOREMEN'S SUPPLY MEN'S ASSOCIATION.—Bradley S. Johnson, W. H. Miner, Rookery Bldg., Chicago, Ill. Meeting with Chief Interchange Car Inspectors' and Car Foremen's Association.
- CINCINNATI RAILROAD CLUB.—W. C. Cooder, Union Central Bldg., Cincinnati, Ohio. Meetings, 2nd Tuesday in February, May, September and November.
- CLEVELAND STEAM RAILWAY CLUB.—F. L. Frericks, 14416 Alder Ave., Cleveland, Ohio. Meetings, first Monday each month, Hotel Cleveland, Public Square, Cleveland.
- EASTERN RAILROAD ASSOCIATION.—E. N. Bessling, 614 F St., N. W., Washington, D. C.
- FREIGHT CLAIM ASSOCIATION.—(See American Railway Association, Division VII.)
- INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—W. J. Mayer, Michigan Central R. R., Detroit, Mich. Next meeting, August 18-20, 1925, Hotel Winton, Cleveland, O. Exhibit by International Railroad Master Blacksmiths' Supply Men's Association.
- INTERNATIONAL RAILROAD MASTER BLACKSMITHS' SUPPLY MEN'S ASSOCIATION.—Edwin T. Jackman, 710 W. Lake St., Chicago.
- INTERNATIONAL RAILWAY CONGRESS.—Office of Permanent Commission of the Association, 74 rue du Progrès, Brussels, Belgium. General secretary, P. Ghilain. Next session of the Congress, London, June 22-July 6.
- INTERNATIONAL RAILWAY FUEL ASSOCIATION.—J. B. Hutchison, 1809 Capitol Avenue, Omaha, Neb. Annual convention, May 11-14, 1926, Chicago. Exhibit by International Railway Supply Men's New York.
- INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1061 W. Wabasha Ave., Winona, Minn. Annual convention, September 8-11, 1925, Hotel Sherman, Chicago.
- INTERNATIONAL RAILWAY SUPPLY MEN'S ASSOCIATION.—F. S. Wilcoxon, The Edna Brass Manufacturing Company, 460 McCormick Bldg., Chicago, Ill. Meeting with International Railway Fuel Association.
- MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 26 Cortlandt St., New York.
- MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION.—See A. R. A., Division V.)
- MASTER CAR BUILDERS' ASSOCIATION.—(See A. R. A., Division V.)
- MOBILE TRAFFIC & TRANSPORTATION CLUB.—T. C. Schley, 71 Conti St., Mobile, Ala. Regular dinner meetings, 6 p. m. on 2nd Thursday of each month, Cawthon Vineyard, Mobile, Ala.
- NATIONAL ASSOCIATION OF RAILWAY TIE PRODUCERS.—J. S. Penney, T. J. Moss Tie Company, St. Louis, Mo. Next convention, 1925, Chicago.
- NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS.—James B. Walker, 49 Lafayette St., New York.
- NATIONAL FOREIGN TRADE COUNCIL.—O. K. Davis, 1 Hanover Square, New York. Twelfth convention, June 24-26, Seattle, Wash.
- NATIONAL HIGHWAY TRAFFIC ASSOCIATION.—Elmer Thompson, 12 East 53rd St., New York.
- NATIONAL RAILWAY APPLIANCES ASSOCIATION.—C. W. Kelly, 825 South Wabash Ave., Chicago. Annual exhibition at convention of American Railway Engineering Association.
- NATIONAL SAFETY COUNCIL.—Steam Railroad Section: E. R. Cott, Safety Agent, Hocking Valley Ry., Columbus, Ohio.
- NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2nd Tuesday in month, excepting June, July, August and September, Copley-Plaza Hotel, Boston, Mass.
- NEW YORK RAILROAD CLUB.—Harry D. Vought, 26 Cortlandt St., New York. Regular meetings, 3rd Friday in month, except June, July and August, at 29 W. 39th St., New York. Midsummer festival, July 9, Travers Island.
- PACIFIC RAILWAY CLUB.—W. S. Wollner, 64 Pine St., San Francisco, Cal. Regular meetings, 2nd Thursday in month, alternately in San Francisco and Oakland.
- RAILWAY ACCOUNTING OFFICERS' ASSOCIATION.—E. R. Woodson, 1116 Woodward Building, Washington, D. C.
- RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 600 Liberty Bldg., Broad and Chestnut Sts., Philadelphia, Pa. Annual meeting, November, 1925.
- RAILWAY CAR MANUFACTURERS' ASSOCIATION.—W. C. Tabbert, 61 Broadway, New York.
- RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, 515 Grandview Ave., Pittsburgh, Pa. Regular meetings, 4th Thursday in month, except June, July and August, Fort Pitt Hotel, Pittsburgh, Pa.
- RAILWAY DEVELOPMENT ASSOCIATION.—(See Am. Ry. Development Assn.)
- RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—Edward Wray, 9 S. Clinton St., Chicago. Annual meeting with Association of Railway Electrical Engineers.
- RAILWAY EQUIPMENT MANUFACTURERS' ASSOCIATION.—Joseph Sinkler, Pilot Packing Co., Peoples Gas Bldg., Chicago. Meeting with Traveling Engineers' Association.
- RAILWAY FIRE PROTECTION ASSOCIATION.—R. R. Hackett, Baltimore & Ohio R. R., Baltimore, Md.
- RAILWAY REAL ESTATE ASSOCIATION.—C. C. Marlor, Room 1143, Transportation Building, Chicago.
- RAILWAY SIGNAL ASSOCIATION.—(See A. R. A., Division IV., Signal Section.)
- RAILWAY STOREKEEPERS' ASSOCIATION.—(See A. R. A., Division VI.)
- RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 1841 Oliver Bldg., Pittsburgh, Pa. Meets with Mechanical Division, A. R. A.
- RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 30 Church St., New York. Meets with Telegraph and Telephone Section of A. R. A., Division I.
- RAILWAY TREASURY OFFICERS' ASSOCIATION.—L. W. Cox, Commercial Trust Bldg., Philadelphia, Pa. Annual meeting, September 8-9, 1925, Hotel Champlain, Bluff Point, N. Y.
- ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—P. J. McAndrews, C. & N. W. Ry., Sterling, Ill. Next convention, September 22-24, 1925, Kansas City, Mo. Exhibit by Track Supply Association.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2nd Friday in month, except June, July and August.
- SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, Sunbeam Electric Manufacturing Company, New York City. Meeting with American Railway Association, Signal Section.
- SOUTHEASTERN CARMEN'S INTERCHANGE ASSOCIATION.—J. E. Rubley, Southern Railway Shop, Atlanta, Ga. Meets semi-annually.
- SOUTHERN AND SOUTHWESTERN RAILWAY CLUB.—A. T. Miller, P. O. Box 1205, Atlanta, Ga. Regular meetings, 3rd Thursday in January, March, May, July, September and November, Piedmont Hotel, Atlanta.
- SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—J. L. Carrier, Car Serv. Agent, Tenn. Cent. Ry., 319 Seventh Ave., North Nashville, Tenn.
- SUPPLY ASSOCIATION OF AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—H. S. White, 9 N. Jefferson St., Chicago.
- TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo-Ajax Corporation, Hillburn, N. Y. Meets with Roadmasters' and Maintenance of Way Association.
- TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, 1177 East 98th St., Cleveland, Ohio. Annual meeting, September 15-18, 1925, Chicago. Exhibit by Railway Equipment Manufacturers' Association.
- WESTERN RAILWAY CLUB.—Bruce V. Crandall, 226 West Jackson Boulevard, Room 1001, Chicago. Regular meetings, 3rd Monday each month, except June, July and August.
- WESTERN SOCIETY OF ENGINEERS.—Edgar S. Nethercut, 1735 Monadnock Block, Chicago, Ill.

CROSSING WARNINGS IN SWEDEN.—A highway crossing signal designed to provide for the infirmity of automobile drivers who are color-blind has been decided upon by the state railroads of Sweden and, according to a dispatch in the Boston Transcript, has been adopted as standard. It is a flashing light, so controlled by an approaching train, that the flashes at such times will occur at a frequency different from that which is normal when no trains are coming. It appears from this dispatch that red lights for stop and lights of another color for safety are in use at crossings in that country and that "many accidents have been found to be due to the inability of drivers to distinguish a green light from a red one." It is also stated that lunar white is to be used in place of green—this, evidently, in places where the new flashing light has not been installed; as, for example, on railroads not owned by the state. Experiments have been made with "ticklers," placed across the highway seven feet above the surface, designed to warn a driver of his approach to a railroad by the striking of light chains on the top of his vehicle.

Traffic News

The Erie will print the amount of fare on printed destination local passenger tickets.

The summer meeting of the Mid-West Regional Advisory Board will be held in Milwaukee, Wis., on July 15.

The Williamsport & North Branch which operates a line from Halls, Pa., to Satterfield, a distance of 44 miles, has applied to the Public Service Commission of Pennsylvania for permission to discontinue passenger service.

The Interstate Commerce Commission has cancelled a hearing to be held on the proposed increased rates on iron and steel products from Atlanta, Ga., and other southern points to Mobile, Ala., and New Orleans, La., following the cancellation of the rates proposed by the railroads.

The Interstate Commerce Commission has ordered a reduction of rates on wheat bran moving from points in Colorado, Utah, Idaho, Wyoming, Montana, Nebraska, Kansas, Iowa, Missouri, Oklahoma, Texas and New Mexico, to points in Louisiana, Texas and New Mexico, by September 20.

The Long Island, which has an application for increased commutation rates pending before the New York City Transit Commission and the New York State Public Service Commission, has agreed to postpone the proposed new schedule until January 1, 1926. The company filed this application for the increase in June, 1924.

The Michigan Central and the Pennsylvania on June 28 placed a new train in service between Chicago and Mackinaw City, Mich., to be known as the North Michigan Special. The train leaves Chicago at 5:10 p. m. daily and arrives in Mackinaw City the following morning where direct boat connection is made for Mackinac Island. The train is equipped with drawing room, compartment and open section sleeping cars, dining car and coaches.

The Pennsylvania inaugurated its summer passenger schedules in the East on June 28 placing a total of 73 trains in service between Philadelphia and Atlantic City, 17 of which will operate into Broad street station via the Delaware river bridge. The Pocono Limited from Philadelphia to resorts in northeastern Pennsylvania made its first trip on July 3. Additional train service is also provided to Asbury Park, Ocean City, Cape May and other New Jersey coast points.

The Atchison, Topeka & Santa Fe for two weeks starting July 20 will operate its "Opportunity Special" through the Kansas wheat belt in conjunction with the Kansas State Agricultural College to demonstrate wheat growing. The demonstration will show the relation of wheat to other crops and to livestock, soil, soil preparation and rotation, pure seed, insect control and the treatment of plant diseases. Three carloads of exhibits will be carried to demonstrate the subjects under discussion.

The New York, New Haven & Hartford put into effect on July 1 an increase of 40 per cent in its commutation rates in the New York suburban zone in New York State and 20 per cent in the New York suburban zone in the state of Connecticut; later on the same day it rescinded the increase. The company filed this new tariff more than a year ago but it was held up several times by the Public Service Commission pending a hearing. The hearing was finally held on May 18 but the decision has not been handed down. Inasmuch as the last postponement for the effective date was June 30, the company placed the new rates in effect on July 1. There was considerable public protest at the increase without preliminary notice and, at the request of the Public Service Commission, the company withdrew it, pending the commission's decision.

Reduction in Freight Claims

Claims growing out of loss or damage to freight shipments while in transit as compared with the volume of traffic handled were less in the first three months this year than in any corre-

sponding period on record, according to reports to the Freight Claims Division of the American Railway Association. Loss and damage claims paid amounted to \$10,444,139, a reduction of more than 23 per cent as compared with the corresponding period in 1924 and a decrease of nearly 5 per cent as compared with the same period in 1923. This also was a decrease of nearly 30 per cent under the total for first quarter in 1922 and 64 per cent below that for 1921.

Northwest Regional Advisory Board to Hold Summer Meeting

The Northwest Regional Advisory Board will hold its summer meeting on July 21 at the New Duluth hotel, Duluth, Minn. This meeting is the yearly preparatory meeting for consideration of crop conditions and the estimating of the volume of grains to be moved in order to give the railroads an opportunity to prepare in advance for any unusual transportation demands and also to estimate the volume that each carrier is to be called upon to handle. Besides committee reports the meeting will consider the freezing of perishable freight, especially liquids in bottles originating within the jurisdiction of the Northwest Board and destined east of Chicago which are given heater protection only as far as Chicago. This board, which is the pioneer of the 11 boards functioning in the United States, is now issuing a monthly bulletin for its members, the third issue of which was published on June 15, 1925. It is issued in co-operation with the American Railway Association Car Service Division, and contains information of interest to its members.

Regional Boards Granted Reduced Rates to Western Carriers

To promote the work of regional advisory boards, western railroads have placed in effect reduced rates of one fare for the round trip for board members attending meetings of their respective boards. The one fare rate is to be made applicable through the identification certificate plan. A regional advisory board wishing to take advantage of the rate concession must furnish the passenger association in its territory at least 15 days prior to the date of the meeting for which the special rate is sought with the date and place of the session, approximate anticipated attendance, and the territory from which members are expected to attend. To permit representatives to travel from another district for a regional board meeting on the one fare rate it will be necessary that the association be advised specifically as to each case of this sort. The carrier groups entering into the plan are the Western Passenger Association, the Trans-Continental Passenger Association, and the Southwestern Passenger Association. The one fare rate applies regardless of the number of members arranging to attend board sessions.

Freight Commodity Statistics

The Interstate Commerce Commission has issued a statement showing by districts and commodities the freight tonnage transported by Class I steam railways for the quarter ended March 31, 1925. Below will be found a comparison, by groups of commodities, of the tonnage transported during the first quarter in 1925 with the corresponding period in 1924:

Classes of commodities	Number of tons originated		
	Quarter ended March 31, 1924	Quarter ended March 31, 1925	Per cent of decrease 1925 under 1924
Products of agriculture.....	25,551,856	25,037,764	2.01
Animals and products.....	6,816,331	6,496,724	4.69
Products of mines.....	142,694,527	138,178,589	3.16
Products of forests.....	29,583,432	29,063,078	1.76
Manufactures and miscellaneous	61,830,406	65,022,833	*5.16
All L. C. L. freight.....	9,875,874	9,665,183	2.13
Total.....	276,352,426	273,464,171	1.05
Classes of commodities	Total tons carried		
	Quarter ended March 31, 1924	Quarter ended March 31, 1925	Per cent of decrease 1925 under 1924
Products of agriculture.....	54,192,534	51,778,098	4.46
Animals and products.....	11,726,555	11,289,604	3.73
Products of mines.....	261,062,452	257,613,551	1.32
Products of forests.....	56,310,561	54,548,189	3.13
Manufactures and miscellaneous	120,314,888	125,478,997	*4.29
All L. C. L. freight.....	16,574,396	16,032,855	3.27
Total.....	520,181,386	516,741,294	.66

*Increase.

New England Shippers' Board to Be Organized

Gov. Alvin T. Fuller of Massachusetts will deliver the address of welcome at the meeting to be held at Boston on July 7, when the New England Shippers Regional Advisory Board will be finally organized. William F. Garcelon of the Arkwright Club in Boston will preside as temporary chairman. Among the speakers will be Percy R. Todd, president of the Bangor & Aroostook, who will discuss "The Advisory Boards from the Viewpoint of the Railway Executives." M. J. Gormley, chairman of the Car Service Division of the American Railway Association, will discuss "The Relationship of the Advisory Boards to the Work of the Car Service Division," while Donald D. Conn, manager of the Public Relations Section, Car Service Division, will speak on the subject: "The Advisory Boards." W. J. L. Banham, of New York, will extend the greetings of the Atlantic States Advisory Board, of which he is general chairman, to the New England Board. Following the addresses, the subject of ratifying the work of the organization committee, which met on June 5 for the purpose of formulating plans for the New England Shippers' Regional Advisory Board, will be considered, the selection of a chairman and other officers of the board will be made and in addition the members of the various commodity committees of the New England Board will be named.

The New England Board will be the eleventh shippers' regional advisory board that has been organized, the entire country being covered by these boards with the exception of the so-called Pittsburgh district and the Pacific Northwest.

Improved Passenger Service on the Rock Island

Chicago, Rock Island & Pacific on July 5 will place in service a new train between Memphis, Tenn., and Amarillo, Tex., to be known as the Chockaw Limited. The train will leave Memphis at 2:30 p. m. arriving in Little Rock at 6:30 p. m., Oklahoma City, Okla., at 6:30 the next morning and Amarillo, Tex. at 6:50 the next evening. The Memphis-California beginning July 5 will leave Memphis at 11:45 p. m. instead of 2:45 p. m. making connections at Tucumcari, N. M., with the Golden State Express out of Chicago for California points. It will arrive in El Paso at 1:30 p. m. the second day and Los Angeles at 2:15 p. m. the third day instead of 7:30 a. m. Returning, it will leave Los Angeles at 10 a. m. and will arrive in Memphis at 6:40 a. m. the third day. Under the new schedule, double daily fast service will be given between Memphis, Tenn., Little Rock, Ark., and Oklahoma City, Okla.

Arrangements have been made between the Rock Island and the Illinois Central whereby double daily fast service will be given between Chicago, Memphis, Little Rock and Hot Springs. The Panama Limited of the Illinois Central which leaves Chicago at 12:30 p. m. and arrives in Memphis at 1:10 a. m. will carry a Hot Springs sleeper which will be delivered to the Rock Island and will arrive in Little Rock at 6:30 a. m. and Hot Springs at 9:30 a. m. This train also will carry a sleeper for the El Dorado oil fields arriving in El Dorado at 12:30 p. m. The train will leave Hot Springs at 4:20 p. m. and Little Rock at 6:40 p. m., on the return trip, arriving at Chicago at 11:30 a. m. the following day.

Great Northern Files Petition

for Motor Bus Operation

The Great Northern has applied to the Minnesota Railroad and Warehouse Commission for permission to establish motor bus routes through its new subsidiaries, the Great Northern Transit and the Minnesota Transportation companies. The plans call for 13 motor bus lines requiring 40 buses to be operated over 1,300 miles of highway in the territory of the Great Northern Railway. Connections will be made with other existing bus lines and a system of interchangeable tickets for passage over combined bus and rail routes is planned. Some buses will operate parallel with the railroad. A terminal garage will be maintained at Minneapolis.

The routes specified by the Great Northern Transit Company are:

- (1) From St. Cloud, Minn., to Fargo, N. D., by way of Sauk Center, Minn., and Fergus Falls.
- (2) From St. Cloud to Fargo, by way of Sauk Center and Wadena.
- (3) From St. Cloud to Bemidji, by way of Sauk Center, Park Rapids and Itasca Park.
- (4) From St. Paul, Minn., and Minneapolis to Hibbing, by way of Milaca, Onamia and Grand Rapids.

The routes specified by the Minnesota Transportation Company are:

- (1) From Willmar, by way of St. Cloud, and Brook Park to Henriette.
- (2) From Willmar, by way of Granite Falls to Marshall.
- (3) From Willmar, by way of Benson, Morris, Wheaton, Herman and Breckenridge to Fargo, N. D.
- (4) From Fargo to Glyndon, Minn.
- (5) From Fargo to Halstead, Minn., and Crookston.
- (6) From Crookston, by way of Warren, Noyes to St. Vincent.
- (7) From Grand Forks, N. D., by way of Crookston to Thief River Falls.
- (8) From Fergus Falls by way of Detroit, Park Rapids, and Walker to Bemidji, (summer service only).
- (9) From Duluth by way of Floodwood, Grand Rapids, Cass Lake to Bemidji.

Central Western Carriers Oppose

Reduction in Livestock Rates

The central western railroads have filed with the Interstate Commerce Commission a brief supplemental to the general brief of the western roads in the case in which the American National Livestock Association is seeking a general reduction in livestock rates. The brief cites the condition of ten individual roads to show that among them are lines that cannot continue to maintain adequate transportation service in the face of a diminution of their revenues, but are instead in urgent need of relief through rate increases, and that an increase of 20 per cent in livestock revenue would be of particular benefit to them. These ten lines discussed in the brief as typical of the territory last year had livestock revenues amounting to \$50,153,797, which was 7.73 per cent of their total revenue and 65.51 per cent of the total livestock revenue of the western roads. Of the ten roads two are operated by receivers, five paid no dividends in 1923, the Rock Island has yet to pay the first dividend on its common stock since it emerged from receivership and the Chicago & North Western has reduced its common dividend. "The showing in respect to these ten roads," the brief says, "clearly demonstrates that adequate transportation service cannot be maintained by them unless their freight revenue is augmented" and "the livestock industry in the territory served can well afford now to contribute to the economic necessities of these transportation systems."

In the discussion of the condition of the individual roads after that of the weaker lines it is shown that the Chicago, Burlington & Quincy, the largest livestock carrier in the world, would have its revenues reduced, if the reduction in rates asked by the complainant were granted, by \$4,029,060, or one-seventh of its net railway operating income, which last year represented a return of only 4.9 per cent on its property investment of 1923. Although the Burlington pays 10 per cent on its common stock, the brief says, the company is undercapitalized and it is not now earning as much on its property as it earned before the war in spite of its investment since. The livestock traffic is said to be not only unremunerative but to throw a burden on other traffic. Similarly the effect of the proposed reduction on the Union Pacific is discussed and the brief says: "We do not understand that it is the purpose of the transportation act of 1920 or of the Hoch-Smith resolution to tear down the most prosperous and strategically located railroads of the United States."

As to the Chicago & North Western, which has reduced its common dividend from 7 to 4 per cent, it is shown that the reduction in rates sought would amount to 21.2 per cent of its net railway operating income for 1923 and would have reduced its earnings on the 1924 traffic by \$3,753,759, which would have prevented it from paying any dividend on its common stock.

A DRIVE TO DODGE DANGER is the name used to describe the activities which have been begun by the cement manufacturers of the country to make June a "no accident month"; and the Portland Cement Association, headquarters 111 West Washington street, Chicago, starting from the fine record which has been made during the past year, aims to accomplish a very high degree of safety in the 135 cement mills belonging to members of this association in the United States and Canada. These mills employ about 40,000 persons, and the safety record for 1924 was about 19 per cent better than that of 1923. The plans of the safety committee for June provide for the putting up of a new bulletin each day, and for posting in each plant a calendar on which a colored marker is to be displayed for every day on which no accident happens. A concrete plaque has been awarded to the Mitchell (Ind.) plant of the Lehigh Portland Cement Company for its low record of accidents last year; only five minor accidents, and no major casualties.

Commission and Court News

Interstate Commerce Commission

The Interstate Commerce Commission has denied the petition of the International Federation of Commercial Travelers' Organizations for a reduction by one-half of the surcharge on parlor and sleeping car tickets.

The Interstate Commerce Commission has issued a modification of its order requiring the use of interchangeable scrip coupon tickets to except any Class I road named as a respondent which is not engaged in performing passenger service by means of regularly operated passenger trains.

Court News

Contributory Negligence of Truck Driver at Crossing

The Court of Appeals of the District of Columbia holds that "an engineer operating a heavy railway train is not required to assume that an auto truck approaching the track at a rate of five or six miles an hour, at a distance from the track of 83 ft. or 70 ft., or even 38 ft., will recklessly continue its course in front of the approaching train." To require him to stop or slacken on the approach of a wagon to the tracks would be a serious embarrassment to traffic. The truck could have been stopped within a few feet, and the engineer had a right to assume that this would be done. The driver of the truck, who had an unobstructed view of the track for 1,519 feet when 29 ft. from it, was held guilty of contributory negligence. Judgment for plaintiff in an action for damages to the contents of the truck was reversed and a new trial ordered.—*B. & O. v. Fidelity Storage Co.*, 2 Fed. (2nd) 310.

Damages for Coal Lost

From a carload of coal weighing 88,700 lb. shipped from Illinois to Minneapolis, 5,500 lb. was lost in transit. The value of the coal in carload lots at Minneapolis at time of arrival was \$5.75 per ton, plus freight. Its retail price there was \$9.70 per ton, plus freight. The coal lost could not be replaced by purchase in the market at Minneapolis at less than \$9.70 per ton, plus freight. The consignee made no such purchase and paid no freight on the lost coal.

In an action by the consignee for damages the railroad admitted the plaintiff's right to recover the value of the lost coal as that value would have been in the car, if the contract of carriage had been properly performed. The consignee claimed the amount he would be obliged to pay in the market at Minneapolis for coal of a like kind and grade sufficient to replace that which had been lost. The federal district court holds the plaintiff was entitled to recover only at the rate of \$5.75 per ton for the lost coal. The court said: "If, in some way, on discovery of the loss, defendant had replaced the missing coal in the car, or had placed therein other coal of the same grade and in like amount, plaintiff could no longer complain. Restoration would then have been complete. Each ton of coal so replaced in the car would be worth \$5.75, and no more. If the coal was not replaced in the car, payment therefor to plaintiff at the rate of \$5.75 per ton would be the money equivalent of the coal, and he would be as well off as if he had that which was lost. * * *

"The contention that plaintiff is entitled to recover the amount which he would be required to pay to replace the coal, which in this case would be the price at retail, is equivalent to a contention that the plaintiff is entitled to recover the amount for which, if he had the lost coal, the same could be sold at retail. Reason and authority both are against a recovery upon such a basis. That would involve a price which would include the cost of unloading the coal from the car, reloading the same on wagons or trucks, hauling and delivery, insurance, collection, bad debts, overhead expenses, profits, and perhaps other items. Plaintiff has no right under the circumstances to sell the missing coal to the defendant at any such price, when none of these items are involved in the transaction."—*Crail v. I. C.*, 2 Fed. (2nd) 287.

Labor News

The Pennsylvania has reached an agreement with its telegraph operators, represented under the company's employee representation plan, calling for certain minor revisions in wages and working conditions.

Bridge Gang Laid Off Entitled to Investigation

A bridge gang on the Great Northern was laid off at Hillyard, Wash., on December 31, 1923, and another gang assigned to take care of its work. A portion of the men in the gang laid off were assigned to duty in the new gang, but the rest of the men were forced to exercise their seniority on the line of road. Upon complaint being made to the management the men were informed that their work was entirely unsatisfactory, whereupon the employees took the position that they were entitled to an investigation in accordance with the provisions of Rule 32 of the agreement. This the management refused to grant. The United Brotherhood of Maintenance of Way Employees and Railway Shop Laborers made an ex parte submission to the Labor Board which rendered the opinion that the procedure followed by the carrier was "most irregular" and that it would have been only just and reasonable to accord the employees an investigation as provided for in the rules. The decision of the Labor Board is that the railroad should have granted the investigation in accordance with the provisions of Rule 32.—*Decision No. 3560*.

Employees Must Pay for Coal

The United Brotherhood of Maintenance of Way Employees and Railway Shop Laborers entered a complaint before the Labor Board arising out of the practice of supplying coal to employees on the Denver & Rio Grande Western. According to the employees' statement, section foremen and bridge and building foremen were furnished free coal prior to the passage of the Transportation Act of 1920, a concession which was made largely because many bridge and building and section foremen were required to maintain boarding camps in which the railroad definitely set the price which was to be charged for meals. However, in recent years the railroad has adopted the practice of charging the men for coal whether used in heating their own homes or for the heating and operation of the boarding camps. The answer made by the railroad was that the practice of furnishing foremen coal free of charge grew out of the fact that there were times when the railroad was permitted to remove mine run coal from the mines without being charged therefor by the operators. The employees, in presenting their claims before the board, asked that the railroad be ordered to refund the money deducted from wages for coal. This was denied by the Labor Board.—*Decision 3569*.

Derrick Engineer Entitled to Expense Money

Complaint was made before the Labor Board concerning a derrick engineer who is employed on the Spokane division of the Great Northern, but is not assigned to any particular bridge and building crew, who contended that he was entitled to expenses while away from Hillyard, where he maintains his home, under an interpretation of Rule 54 of the agreement which reads: "Employees will be reimbursed for meals and lodging incurred while away from their regular headquarters or outfits, by direction of the management, whether on or off assigned territory. This rule not to apply to midday lunch customarily carried by employees or to employees temporarily transferred as covered by Rule No. 16." The position of the carrier was that the derrick engineer is in the same category as any member of the bridge and building crews with which he works for the reason that a bunk car accompanies the steam derrick, thereby affording him the same accommodations as are furnished the bridge and building crew. The decision of the Labor Board is that the derrick engineer shall be allowed expenses while away from Hillyard, unless he is provided with a place to sleep and is working with a bridge and building gang with which he can secure his meals without expenses or have the car equipped not only with a bunk but also for meals.—*Decision No. 3676*.

Foreign Railway News

Fatal Accident in Russia

Nine persons were killed and 32 injured on June 29, in the derailment of an express train en route from Chita to Moscow, at Tiaga.

Mexican Railways to Reduce Forces

President Calles of Mexico has announced a program of economy for the National Railways of Mexico, which involves a gradual reduction in forces until 14,000 employees have been dismissed. He has issued a warning that protest strikes or other manifestations will not be tolerated.

Latvo-German Transit Trade Agreement

The Latvian cabinet has recently passed regulations regarding the transit of German goods through Latvia, under which the Latvian Railway Administration agrees, for a certain compensation, to change the axles of German (standard) gage railway cars to Russian gage axles in Duenaburg, and to convey the trains through Latvia, according to Commercial Attaché Mayer at Riga. The tariff is similar to that in existence for Russian transit goods. By handling the Russian traffic Latvia collects about 4,000,000 lats of foreign currency a year and hopes to derive an equal amount from conveying German transit goods.

Swiss Federal Railways Prosperous in 1924

The year 1924 was favorable for the Swiss railways, according to Commercial Attaché Jones at Paris. Traffic increased, and the showing of the operation and profit and loss accounts was the best since the repurchase of the roads by the state.

Receipts for the carriage of passengers showed an improvement of 5,000,000 francs over 1923, a gain of approximately 4 per cent, the total receipts amounting to 132,450,507 francs. The improvement is largely due to increased tourist traffic, a development the more remarkable because of the very high rate of fares. Freight receipts recorded a more rapid increase, gaining by 27,737,884 francs, and making a total for the year of 248,741,276 francs. This favorable showing is due to the revival of business that characterized the past year. Transit traffic also contributed to the result to an important degree, in spite of the increasing competition of other means of transportation.

The operating account of Swiss lines declined steadily from 1920 to 1923 but rose in 1924 to 272,031,489 francs, an increase of 11,784,652 francs over 1923. This represents an advance of about 4½ per cent, which is considered normal, due to the increase of locomotive-kilometers traversed.

The Railways of Yugoslavia

In pre-war Serbia, the construction of railways was hindered by difficulties of surface, insufficiency of financial resources, and most of all by the political influence, according to R. Avramovitch, Under-Secretary of Communications of Yugoslavia. The first lines, Belgrade-Nish-Ristovatz (old Turkish frontier till 1912) and Nish-Pirot (the town near the Bulgarian frontier) were constructed under the provisions of the Treaty of Berlin, 1878. These lines were opened for traffic in 1884.

Till the Balkan War 1912-1913, few railway lines were constructed owing to the lack of capital. After the Balkan War the Belgrade-Nish-Ristovatz line was extended to Skoplje (Uskub)-Veles-Djevdjelija.

The length of railways at present operated by the Yugoslav state is 10,000 kms., of which 7,000 kms. are of normal and 3,000 kms. of narrow gage. Private railways have 750 kms. of normal and 900 of narrow gages. Most of the private systems are of secondary importance.

All pre-war Serbia's rolling stock was destroyed. It is true that considerable quantities of material were taken as booty of war, but these were in an extraordinarily delapidated condition. At the cost of enormous efforts and great sacrifice 60 per cent of

the rolling stock taken as war booty was repaired. This work has been done in the state workshops, and in private works at home and abroad, in Austria, Czecho-Slovakia and Hungary. Most of the coal used on the railway is mined in the country; a certain amount is being provided until 1926 by Hungary and Bulgaria as war reparations. The price of coal has increased over pre-war prices in the proportion of 40 to 1. Lubrication material comes from abroad, and is extremely high in price, having risen to 50 times the old price. Traffic in ton-kilometers exceeds pre-war about 3½ times.

China and Soviet Disagree Over Chinese Eastern

PEKING.

The tension between the Chinese and the Soviet authorities over the Chinese Eastern Railway continues to grow. The Soviet general manager Ivanoff, recently issued an order dismissing some 300 Russian employees who have failed or refused to register as citizens either of China or of Soviet Russia. This order was met by one from the Chinese president, Pao Kuei-ching, instructing all such to remain at their posts inasmuch as the general manager's order had not been approved by the board of directors. "Comrade" Karakhan, the Soviet ambassador in Peking, has made the incident one for diplomatic representations and in addition has presented a bill for 12,000,000 roubles for services rendered by the Chinese Eastern to the military authorities of Manchuria. Furthermore, he charges that the military are shipping commercial cargo as military stores because of the half-rates (which are not paid) and supports his charge by a bill of particulars, quoting date, shipment number, consignor and consignee, and tracing shipments to destination on connecting lines in some instances. He declares that unless this sort of thing is discontinued the railway will refuse to furnish cars to the military. This would bring on an armed clash undoubtedly, for the Chinese military would not hesitate to seize cars as needed, which most likely would bring on an invasion by Soviet troops to protect their property in the railway.

The massing of Soviet troops at Vladivostok, on the Ussuri Railway and just west of Manchuli, is reported. Much of this, however, is very likely more in the way of gestures preliminary to the Sino-Soviet negotiations which are about to open concerning the final status of the railway.

On May 16 the "outside wall" portion of the Peking-Mukden railway was consolidated with the "inside wall" portion under the jurisdiction of the Ministry of Communications. It is understood that the Ministry of Communications has promised to pay Chang Tso-lin \$400,000 per month out of the earnings of the consolidated line. Under the old conditions this would not have been a serious difficulty, but unless the present efficiency of the line be improved or some of the branch line construction be halted, the Peking-Mukden is going to be hard pressed to meet these payments.

During the week, May 11-16, the tenth conference of the standing committee on the unification of railway accounts and statistics was held in Peking. For two years no conferences had been held due to disorders occurring just at the time conferences were called. Besides the routine work of interpretation and revisions of existing accounting rules, the tenth conference drew up rules for the preparation of budget estimates covering revenues, expenses, capital improvements and cash requirements and for the effective supervision of disbursements according to these estimates. It is believed that as a result of these rules, the Ministry of Communications is to raise the status of the railway chief accountants to that of comptrollers.

Miscellaneous Items

The following reports have been received by the Bureau of Foreign and Domestic Commerce from its agents in various parts of the world:

Passenger locomotives on the Indian government railways must have electric headlights under a recent order by the Railway Board. The work is now being undertaken, and it will probably be only a short time until freight as well as passenger engines will be equipped with headlights.

British builders have secured orders for locomotives for the Egyptian State Railways, although all British bids were substantially above German, French and Italian offers. The British bid was accepted because quick delivery could be secured.

Estimates for the construction of a railway from Mukden to Hailung, in the Fengtien province northeast of Mukden on the

Huifa Ho river, have been called for by the Fengtien provincial government. The length of the road will be 193 miles. It will be capitalized at approximately \$5,000,000.

Conflicting statements as to return of the Mexican railways to private interests are appearing in the Mexican press. One paper claims that the government will return the railways within three months; another denies this, claiming, on the other hand, that the government contemplates buying the 49 per cent of the stock owned by private individuals in order to acquire complete and permanent possession of the railways.

Calls for tenders for 40 first class and 75 steel third class coaches for the Egyptian State Railways have recently been issued. First class cars must be of all-steel construction, with internal finishing in wood. Tenderers may submit offers for the supply of 5, 10, 20, 30, or 40 cars. Of the third class cars, 25 will be brake thirds, and all must conform to the Egyptian State Railway's specification for steel third class coaches.

The Rumanian State Railways are negotiating for the lease of Czech railway cars, which are the property of a company controlled by the sugar manufacturers of Czechoslovakia. The proposal under consideration provides for the leasing of 1,000 twenty-ton open cars for a period of five years at a rental of 1½ Swiss francs per day per car. It is understood that the cars will be used by the Rumanian Railways to transport wood.

The Eastern Bengal Railway plans extensive development during the next two years. The main feature includes the construction of an overhead electric railway from Sealdah into the heart of Calcutta, with a terminus in the vicinity of Clive street.

Lithuania has obtained a loan of £1,000,000 in England, to be taken in railway material.

A new improved type of rail motor car for Victorian State Railways has been accepted and will soon be placed in service. The car has accommodations for 60 passengers divided into two classes. It is fitted with a 100 h.p. engine, air brakes and electric light, and can be heated when required. It is capable of 40 to 50 miles an hour on level track and is claimed to run as smoothly as the heavy corridor cars of steam trains. The car weighs 12½ tons, pulls a trailer for baggage, freight, etc., and can be operated from either end.

A total of \$6,552,000 for additional facilities for the Madras & Southern Mahratta is provided in the recently approved budget of the railway for the current financial year, which also provides an expenditure from revenue funds on replacement of wasting assets of \$3,564,000.

Forty-eight privately owned Czechoslovak railways will be nationalized under a bill passed May 28. The roads, which extend for 1,859 kilometers, are mostly in Bohemia. At present their total assets are 217,000,000 Czechoslovak crowns (\$6,427,323) and their liabilities 309,000,000 crowns (\$9,152,208).

Plans for a railway line from Polish Silesia to Kiwerce, in the Eastern District are going steadily forward. The construction work will be undertaken by the English "Armstrong" group, in conjunction with local groups and the "Polish Building Enterprise." The total cost of construction is estimated at \$65,000,000.

German passenger rates are 62 per cent above pre-war since the 10 per cent increase which became effective May 1. First-class fares are 10.8 pfennig per kilometer compared with 7 pfennig.

The Norte Railway (Spain) plans improvements during the next two years, including the purchase of 138 passenger cars, 300 baggage cars, 1,750 closed freight cars, and 3,000 flat cars. In addition, the following expenditures are expected to be made: For finishing work already under contract 64,700,000 pesetas; for new construction, 141,750,000 pesetas; and for new material, 96,000,000 pesetas. (1 peseta equals \$0.1456, at rate of June 25.)

The resumption of traffic between Germany and Turkey and Bulgaria across Austria, Yugoslavia, Hungary, Czechoslovakia, and Rumania, was arranged at a conference recently held at Bucharest. Direct transit traffic will be established in July, according to tentative arrangements. Passenger and baggage rates will be based on the dollar.

The Constantza-Tulcea railway line (Rumania) is practically complete as far as Babadag, and was scheduled to open for traffic about June 1. Heretofore railway connection with northern Dobruja has been lacking and the cities of Tulcea and Babadag have been dependent on the Danube for transportation. This new section of railroad will also connect Babadag with the Bulgarian border, crossing the main line from Constantza to Bucharest at Medgidia.

Equipment and Supplies

Locomotives

THE MINNEAPOLIS & ST. LOUIS is now reported as inquiring for 30 Mikado type locomotives.

E. ATKINS & Co., have ordered 3 locomotives from the American Locomotive Company.

THE NITRATE RAILWAYS OF CHILE have ordered 6 Mikado type locomotives from the Baldwin Locomotive Works.

THE NORFOLK & WESTERN has ordered 30 engine tenders of 16,000-gal. capacity from the Baldwin Locomotive Works.

THE TEXAS & PACIFIC has authorized the purchase of 10 heavy freight locomotives, 10 switching locomotives and 5 passenger locomotives.

THE SIAMESE STATE RAILWAYS have ordered 4 three-cylinder Mikado type locomotives and 4 three-cylinder Pacific type locomotives from the Baldwin Locomotive Works.

Freight Cars

THE BANGOR & AROOSTOOK is inquiring for 200 underframes and superstructures.

THE PHILLIPS PETROLEUM COMPANY is inquiring for from 150 to 250 insulated tank cars.

THE ANDES COPPER MINING COMPANY is inquiring for 66, 40-ton, meter gage, Inglesby ore cars.

THE CHICAGO, ROCK ISLAND & PACIFIC will repair 200 miscellaneous freight cars in the Silvis, Ill., shops.

THE PURE OIL COMPANY, Columbus, Ohio, has ordered five underframes from the Standard Tank Car Company.

THE PITTSBURGH & WEST VIRGINIA will have 100 coal cars repaired in the shops of the Greenville Steel Car Company.

THE KENTUCKY GAME & FISH COMMISSION has ordered one game and fish car, from the American Car & Foundry Company.

THE INTERNATIONAL RAILWAYS OF CENTRAL AMERICA have ordered 20 stock cars of 20 tons' capacity from the Magor Car Corporation.

THE VIRGINIA SMELTING COMPANY has ordered from the American Car & Foundry Company two tank cars, with 30-ton trucks and 20-ton tanks.

THE TEXAS & PACIFIC has authorized the purchase of 750 gondola cars. The inquiry for 500 gondola cars reported in the *Railway Age* of June 27 was for estimating purposes only.

THE WESTERN PAPER MAKERS' CHEMICAL COMPANY, Kalamazoo, Mich., has ordered three 8,000-gal. coiled tank cars from the Standard Tank Car Company in addition to the two reported in the *Railway Age* of June 20.

THE PACIFIC FRUIT EXPRESS has ordered 128 refrigerator cars from the Pacific Car & Foundry Company. In the *Railway Age* of June 27, the FRUIT GROWERS EXPRESS was incorrectly reported as having ordered materials for these cars.

THE GREAT NORTHERN has ordered 1,000 box car underframes from the Siems-Stembel Company, 1,000 box and 200 flat car underframes from the Pressed Steel Car Company. Inquiry for this equipment was reported in the *Railway Age* of June 20.

Passenger Cars

THE ERIE is inquiring for 3 passenger car underframes.

THE BALTIMORE & OHIO has ordered 5 dining cars from the Pullman Car & Manufacturing Corporation.

THE PENNSYLVANIA has ordered one combination baggage and mail rail motor car with a trailer car from the J. G. Brill Company.

THE MUSCLE SHOALS, BIRMINGHAM & PENSACOLA has ordered equipment for a gasoline rail motor car from the J. G. Brill Company.

THE NATIONAL RAILWAYS OF MEXICO are now inquiring for 10 first class narrow gage coaches, 20 second class narrow gage coaches and 25 express cars. The express cars are to be 72 ft. long.

Iron and Steel

THE NORFOLK & WESTERN is inquiring for 46,500 tons of rail.

THE ST. LOUIS SOUTHWESTERN is inquiring for 15,000 tons of 90-lb. rail.

THE ILLINOIS CENTRAL has ordered 1,450 tons of structural steel from the American Bridge Company.

THE LOUISVILLE & NASHVILLE has ordered 7,500 kegs of spikes from the Tennessee Coal, Iron & Railroad Company.

THE CHICAGO & EASTERN INDIANA has ordered 2,000 tons of structural steel from the McClintic-Marshall Company.

THE CHESAPEAKE & OHIO has ordered 7,500 kegs of spikes and bolts from the Tredegar Company, Richmond, Va.

THE ATCHISON, TOPEKA & SANTA FE has ordered 200 tons of structural steel from the McClintic-Marshall Company.

THE GREAT NORTHERN is inquiring for 3,500 tons of structural steel for a 124 pocket ore dock, including doors, chutes, ladders, railings, etc., for delivery September 1 to December 1, 1926. The company is also asking for 520 tons of structural steel ore spouts, including bails and pins, for delivery January 1 to March 1, 1927.

Machinery and Tools

THE CHICAGO, ROCK ISLAND & PACIFIC has placed an order for a 4-spindle drill.

THE SOUTHERN PACIFIC has placed an order for a 10-ton, 36-ft. span traveling crane.

THE ILLINOIS CENTRAL is expected to enter the market soon for machine tools for its shops at Paducah, Ky.

THE GEORGIA, FLORIDA & ALABAMA has ordered one standard ditcher from the American Hoist & Derrick Company.

THE ILLINOIS CENTRAL has placed orders for 2, 90-in. heavy driving wheel lathes; one 90-in. quartering machine and one 48-in. car wheel borer.

THE CHESAPEAKE & OHIO has ordered one 300-ton locomotive hoist, and two 50-ton drop tables from the Whiting Corporation, and 28 one-ton chain blocks from the Chisholm & Moore Manufacturing Company.

Signaling

THE NEW YORK CENTRAL, Lines West, has ordered from the General Railway Signal Company one 48-lever Model 2 unit lever type electric interlocking machine for installation at Parma, Ohio. This machine will have 40 working levers and 8 spare spaces complete with forced-drop electric locks.

THE MISSOURI PACIFIC has authorized the installation of automatic block signals to protect 234 additional miles of road on the line between St. Louis, Mo., and Texarkana, Ark., to cost \$865,000. The new automatic signals will be installed between Poplar Bluff, Ark., and Bald Knob, a distance of 122 miles, and from Benton, Ark., to Clear Lake Junction, a distance of 112 miles.

THE NORFOLK & WESTERN has ordered from the General Railway Signal Company seven complete engine equipments of the intermittent inductive auto-manual type train control, of the same design as that furnished the Atlantic Coast Line to be used for equipping Norfolk & Western class J engines for operation over Atlantic Coast Line tracks between Richmond, Va., and Petersburg, Va.

THE BANGOR & AROOSTOOK has ordered from the General Railway Signal Company materials for the installation of direct-current automatic block signals at Mapleton, Me. These consist of 8 Model 2A bottom post signal mechanisms, 2 Model 2A bottom post bridge signal mechanisms, 2 Model 5, switch circuit controllers, 8 Model 6A switch circuit controllers, 24 Model 9E, neutral relays, battery chutes, cable posts, relay boxes and other miscellaneous items.

THE ILLINOIS CENTRAL has ordered from the Union Switch & Signal Company 47 locomotive equipments and the necessary wayside material for the installation of the Union continuous inductive automatic train stop system between Champaign and Branch Junction. The installation covers 122 miles of double track and is the continuation of the 22-mile trial installation of the Union continuous system previously installed between Champaign and Tuscola.

THE ERIE has ordered from the General Railway Signal Company one d.c. electric interlocking machine having 40 working levers and 16 spare spaces, equipped with 15 forced-drop lever locks, for installation at Paterson, N. J. The order also includes 20 Model 5A d.c. switch machines, four 3-arm triangular color light signals, three 1-arm 3-indication triangular color light signals, one clockwork time release, one operating switchboard, one power switchboard and 60 Model 9E relays.

LOCOMOTIVES ORDERED, INSTALLED AND RETIRED

Month—1924	Domestic orders reported during month	Installed during month	Aggregate tractive effort	Retired during month	Aggregate tractive effort	Owned at end of month	Aggregate tractive effort	On order first of following month	Building in R. R. shops
July	83	197	10,590,558	113	3,354,456	65,008	2,576,433,377	401	63
August	8	229	12,513,395	166	5,346,176	65,062	2,583,372,980	324	50
September	101	160	7,061,560	151	4,351,378	65,071	2,586,083,994	285	37
October	135	113	5,743,775	220	5,712,633	64,964	2,586,106,026	358	76
November	90	181	8,460,795	263	7,749,794	64,882	2,586,826,278	265	70
December	172	295	12,311,451	304	9,724,426	64,871	2,589,358,971	287	64
Total for year 1924.....	1,413*	2,246	.....	2,148	.....	.....	.....	.....	.....
January, 1925	27	167	7,455,971	213	6,242,079	64,824	2,590,525,478	280	81
February	49	125	6,235,494	169	5,118,878	64,779	2,591,618,849	293	77
March	106	138	6,249,721	170	4,888,933	64,747	2,592,979,637	315	83
April	84	171	7,498,252	409	13,126,135	64,509	2,587,347,354	340	82
May	51	147	7,930,840	172	5,329,461	64,484	2,589,912,779	329	80
June	16	.....	.....	.....	.....	.....	.....	.....	.....
Total for 5 months.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total for 6 months.....	333	.....	.....	.....	.....	.....	.....	.....	.....

Details as to orders from *Railway Age* weekly reports. Figures include all domestic orders placed with builders and railroad shops, but not rebuilt equipment.

Figures as to installations and retirements prepared by Car Service Division, A. R. A., published in Form C. S. 56A-1. Figures cover only those reports reporting to the Car Service Division. They include equipment received from builders and railroad shops. Figures of installations and retirements alike include also equipment rebuilt to an extent sufficiently so that under the accounting rules it must be retired and entered in the equipment statement as new equipment. Figures as to orders as given in first column of table is not therefore comparable with figures relating to installations given in succeeding columns.

* Corrected figure.

Supply Trade News

The Truscon Steel Company is planning an addition to its plant in Younstown, Ohio.

The Bassick Manufacturing Company, Chicago, will construct a one-story machine shop to cost \$125,000.

The Crane Company, Chicago, contemplates the construction of a factory and distributing plant at Houston, Texas.

Henry S. LaBarge, manager of the railroad department of the H. Channon Company, Chicago, has been promoted to vice-president, succeeding B. Berntsen, resigned.

H. P. Rodgers & Co., Leader-News building, Cleveland, Ohio, has been appointed Cleveland representative for the Scott Valve Manufacturing Company, Detroit, Mich.

The Inland Steel Company has placed a contract with the McMyler Interstate Company for the construction of two 15-ton electric traveling ore bridges at Indiana Harbor, Ind.

Charles M. Bullard, 912 Washington street, Appleton, Wis., has been appointed representative of the Uehling Instrument Company, Paterson, N. J., for central and northwestern Wisconsin.

Herbert G. Cook has been appointed Pacific coast representative of the Railway Steel-Spring Company, New York. Mr. Cook's headquarters are at 582 Market street, Hobart building, San Francisco, Cal.

W. D. Horton, western railway representative of the Murphy Varnish Company, at Chicago, has been appointed manager western railway sales, with headquarters at 50 West Twenty-second street, Chicago. From 1908 to 1914 he was associated with the *Railway Age* as traveling subscription representative and on April 1, 1914, was appointed circulation manager, which position he held until March 1, 1919, when he resigned to go as district railway sales manager to the Patton Paint Company. On December 1, 1919, he resigned to become associated with the Murphy Varnish Company as western railway representative, which position he held until his recent promotion. Mr. Horton has had a wide selling experience, having spent several years previous to 1908 selling various commodities such as stationary engines, boilers, wood-working and other machinery. In this work he traveled extensively in North America, the West Indies and in Central and South America.

L. W. Grout, vice-president and sales manager of the Keating Valve Company, Springfield, Mass., for the past three years, has joined the sales organization of the Bridgeport Brass Company, Bridgeport, Conn.

Otis B. Duncan, 53 West Jackson boulevard, Chicago, has been appointed representative for the Chicago territory of the Johnston Manufacturing Company, Minneapolis, Minn., manufacturers of industrial oil burning equipment.

The Union Tank Car Company has awarded a general contract to the Hughes-Foulkrod Company, Pittsburgh, Pa., for a car construction, repair and conditioning plant at Whiting,

Ind., including a foundry, machine shop, power plant, wheel shop, and other structures, to cost approximately \$1,700,000.

The Cleveland Crane & Engineering Company, Wickliffe, Ohio, has appointed the following representatives: the Kirby Machinery Company, Toledo, Ohio, the J. H. Overpeck Company, Pittsburgh, Pa., the A. D. Heath Machinery Company, Indianapolis, Ind., Julius Andrea & Sons, Milwaukee, Wis., and the D. H. Braymer Equipment Company, Omaha, Neb.

B. A. Tozzer, manager of the Cleveland office of the Niles-Bement-Pond Company, New York, has been appointed sales manager of the New York office. A. E. R. Turner, in charge of the office at Walkerville, Canada, succeeds Mr. Tozzer at Cleveland. Sydney Buckley, chief engineer at Philadelphia, Pa., has been appointed works manager of the crane works at Philadelphia, to succeed V. O. Strobel, resigned.

John F. Schurch, vice-president of Manning, Maxwell & Moore, Inc., has been elected president to succeed John M. Davis, who resigned to become president of the Delaware, Lackawanna & Western, as was announced in the *Railway Age* of June 13. Mr. Schurch graduated from the University of Minnesota in 1893. The same year he entered the service of the Minneapolis, St. Paul & Sault Ste. Marie, where he served consecutively in the office of the auditor, the general superintendent and in the transportation department, resigning in 1905 after having attained the position of chief clerk to the vice-president. He was then associated with the Railway Materials Company of Chicago until February, 1914, when he was elected vice-president of the Damascus Brake Beam Company, with office in Cleveland, Ohio. The following June he was elected president of the same company, which position he resigned later in the same year and was elected vice-president in executive charge under President T. H. Symington, of the T. H. Symington Company. In June, 1922, Mr. Schurch left the Symington Company to become a vice-president of Manning, Maxwell & Moore, Inc., in charge of sales in the middle west and the west, with headquarters in Chicago. Mr. Schurch served in 1922 as president of the Railway Supply Manufacturers' Association, which had in charge the exhibits at Atlantic City in connection with the meetings in June of Division 5—Mechanical, and Division 6—Purchases and Stores, A. R. A.

The Prentiss Vise Company, New York, has bought the Henry Cheney Hammer Corporation, of Little Falls, N. Y., complete, and will continue to operate the plant at Little Falls with the same personnel that has been there for some time. The Cheney hammers will in future be sold through the Prentiss Vise Company, and the hammer plant will be operated as the Cheney Hammer division of the Prentiss Vise Company.

Henry S. Mann, for many years district manager in charge of the Chicago office and shops of the Metal & Thermit Corporation has resigned to become district sales manager of the Standard Stoker Company, Inc., New York. Mr. Mann will have his headquarters in the McCormick building, Chicago. Previous to entering the service of the Metal & Thermit Corporation he had been connected with a number of railways, serving as a locomotive engineer with the Boston & Maine, the Northern Pacific, the Atchison, Topeka & Santa Fe and the Wabash. He has served as a director of the National Railway Appliance Association of Chicago; vice-president of the American Welding Society and vice-president of the International Railroad Master Blacksmiths' Supply-men's Association.



W. D. Horton



J. F. Schurch

Railway Construction

BALTIMORE & OHIO.—A contract has been awarded to the Vang Construction Company, Cumberland, Md., for the construction of a water supply reservoir at Lumbersport, W. Va., at a cost of approximately \$28,000.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—Plans are being prepared for the construction of a 50-ft. by 350-ft. brick and concrete freight station at Dayton, Ohio.

KANSAS CITY, MEXICO & ORIENT.—A locating party is now making surveys for the proposed extension from Alpine, Tex., to the Rio Grande at Presidio. Surveys are also being made for a branch from San Angelo, Tex., to Del Rio, and for a line from Foley, Okla., to Ewing, between which points the Orient now operates over the tracks of the St. Louis-San Francisco.

LOS ANGELES HARBOR.—The Los Angeles Board of Harbor Commissioners plans to construct a municipal terminal railroad around the harbor and thus combine ownership and control of both ship and railway facilities. It is pointed out that at present the east side of the main channel is reached only by the Union Pacific and the west side by the Southern Pacific.

MISSOURI PACIFIC.—This company is reported to be planning the construction of a passenger and freight station at Kensett, Ark.

MISSOURI PACIFIC.—The construction of ten miles of second track between Cypress Junction, Ark., and Benton, has been authorized. The project will cost approximately \$395,000.

MOBILE & OHIO.—A general contract for the construction of repair facilities at Jackson, Tenn., at a cost of \$1,250,000, has been awarded to Dwight P. Robinson & Co., New York. The buildings to be constructed include a locomotive repair shop, 525 ft. by 205 ft., a store room and office building, 220 ft. by 60 ft., and a locker building, 100 ft. by 50 ft.

NEW YORK CENTRAL.—The Public Service Commission of New York has issued an order directing the New York Central to prepare plans for the electrification of its line from Spuyten Duyvil creek south to its Sixtieth street yard in New York City. Plans and specifications are to be filed by September 1. The company is also required to submit by September 1 a statement of detailed plans showing the method by which it will electrify its lines in New York City from the Sixtieth street yard south to its freight terminal at St. John Park. All lines in New York City must under the law as it now stands be electrified by January 1, 1926, but definite plans for the N. Y. C.'s west side line have been held in abeyance pending agreement with the city authorities with reference to grade separation on this line. The commission's order is taken to mean that electrification must proceed regardless of the grade separation plan. The commission has extended to September 1 the date when the road must file plans for the electrification of its Putnam division and Saw Mill river branch in Westchester county.

PENNSYLVANIA.—A contract has been awarded to the John F. Casey Company, Pittsburgh, Pa., for the demolition of a portion of the Grant street freight station, that city, and removal of tracks adjacent thereto. This work is preliminary to extensive terminal improvements in Pittsburgh.

SOUTHERN PACIFIC.—The construction of a secondary main line from Niland, Cal., to Salton, a distance of 30 miles, which would follow the old line of the railway used prior to the flood of 1905, is contemplated. The proposed line would be approximately four miles shorter than the one now in use.

ST. LOUIS-SAN FRANCISCO.—The passenger station at Fayetteville, Ark., will be remodeled and a freight station will be constructed at a total cost of \$69,000.

ST. LOUIS-SAN FRANCISCO.—A contract has been awarded to the Hedges Construction Company, Springfield, Mo., for the construction of a reinforced concrete and steel viaduct at Fort Scott, Kan.

Railway Financial News

ATLANTA TERMINAL.—Bonds Authorized.—The Interstate Commerce Commission has granted authority to issue not exceeding \$200,000 first mortgage 20-year bonds, series B, to be sold at not less than 98 per cent, proceeds to be used to compensate for expenditures made since August 1, 1919, and for the construction of a new train shed. Authority was also granted to the Central of Georgia, the Atlanta & West Point and the Southern to assume obligation and liability with respect to the bonds. Commissioner Eastman dissented.

BIRMINGHAM & NORTHWESTERN.—Bonds.—This company has been authorized by the Interstate Commerce Commission to sell \$75,000 6 per cent first mortgage bonds to be used to pay off a loan from the government.

BIRMINGHAM SOUTHERN.—Tentative Valuation.—The Interstate Commerce Commission has issued a tentative valuation report as of June 30, 1917, placing the final value for rate-making purposes of the carrier property owned and used at \$3,435,000.

CENTRAL OF NEW JERSEY.—Extra Dividend.—An extra dividend of 2 per cent has been ordered by the directors, payable August 15 to stockholders of record August 5. This is in addition to the regular quarterly payment of 2 per cent, ordered for July 15 to stock of record July 7.

CHESAPEAKE & OHIO.—Acquisition.—This company has applied to the Interstate Commerce Commission for authority to acquire control by lease of the Sandy Valley & Elkhorn. Report of the purchase of the latter appeared in the *Railway Age* of May 2, 1925.

CHICAGO & NORTH WESTERN.—Abandonment.—This company has applied to the Interstate Commerce Commission for authority to abandon a narrow-gauge branch line from Fennimore to Woodman, Wis., 16.4 miles.

CHICAGO, MILWAUKEE & ST. PAUL.—Roosevelt & Son's Study.—Roosevelt & Son, New York, have issued their study of the Chicago, Milwaukee & St. Paul situation, announced previously as being in preparation. In an advertisement, addressed to St. Paul security owners, announcing that the study was ready for distribution, Roosevelt & Son said in part:

"We believe the evidence is overwhelming that the decline in financial strength of the northwestern roads and the receivership of the St. Paul road has been caused, not by lack of traffic, inefficient operation or over-capitalization, but by confiscatory freight rates.

"On behalf of ourselves and of the owners of large amounts of securities of every class, we refuse to acquiesce in what appears to be the destruction of your property through confiscatory rates. We have engaged counsel and railroad experts, and will use every legitimate and lawful means for defense. This matter, however, should not be confined to an investment house but should be the work of a committee representing all those owning St. Paul securities. We contemplate the organization of such a committee, based upon the responses to this notice. We welcome suggestions. We do not ask you to deposit bonds or stock. We do ask your aggressive support in this effort to protect your property from confiscation.

"We do not comment in detail upon the proposed reorganization plan, as we deplore any division of opinion among the security holders. However, we recommend that you do not deposit your securities under this plan because we believe that such action amounts to acquiescence in confiscatory rates and in the unfair and severe requirement of the immediate liquidation of the government loan. Such acquiescence will seriously handicap any efforts to secure higher rates and a fair adjustment of the government loan."

The study itself was prepared under the direction of T. A. Hamilton, formerly president of the International-Great Northern. It analyzes the principal reasons given for the receivership, namely, (1) loss of traffic; (2) over capitalization, bad financial structure and bad financing; (3) physical condition of the property; (4) extravagant electrification; (5) inefficient operation and management; and (6) insufficient freight rates in the northwestern territory. The study emphasizes that the sole cause of the St. Paul's difficulties is the sixth reason, namely, the insufficient rate structure. Excerpts giving some of the points brought out in the report follow:

Loss of Traffic.—The St. Paul has not lost traffic since the days when it was prosperous. Since the Puget Sound extension was taken into system operations in 1913, freight traffic has increased from 8,570,000 tons hauled

one mile to 11,004,765,000 in 1924. From 1915, the first full year of operation of the Panama Canal, to 1924, the tons hauled one mile have increased 34 per cent, and the tonnage of forest products (frequently specifically mentioned as having been diverted to the canal) has increased 84 per cent. Of course the mileage of the road has been increased, but the volume of freight traffic has increased even more as is evidenced by an increase in density (tons one mile per mile of road per annum) of 12 per cent since the Puget Sound extension was taken over for operation. In fact, since putting the new mileage into operation the St. Paul has fared much better in this respect than its principal competitors, the Northern Pacific and the Great Northern, the traffic density of both these lines showing a slight decrease in 1924 as compared with 1913.

Over-capitalization.—The total capitalization as compared with volume of traffic (per 1,000 net ton-miles hauled) in 1924 was less than that of many prosperous railroads carrying a similar type of traffic. Likewise, a comparison with roads carrying all types of traffic shows the conservatism of the St. Paul's capitalization when measured by the yard-stick of government valuation. We agree with the contention that the federal valuation of the property is too low, but even accepting the government's own figure of reproduction cost—new, the outstanding securities are very conservative.

Physical Condition of the Property.—The St. Paul property, on the whole, is in good physical condition. A recent inspection by competent engineers indicates that there is no substantial amount of deferred maintenance. This is all the more remarkable because at the end of federal control in 1920 the property was in a very run-down condition.

Extravagant Electrification.—The electrification only cost 15 million dollars, of which the federal government when in control of the railroads spent approximately one-half in order to electrify one-third of the mileage, while the company electrified two-thirds with the other one-half of the money. We believe the electrification has been advantageous.

Inefficient Operation and Management.—Comparison of the St. Paul with some prosperous roads which have somewhat similar traffic indicates clearly that for a number of years past the St. Paul has been efficiently operated. The roads with which comparison is made are all strong, well-operated properties, viz.: St. Louis-San Francisco, Missouri-Kansas-Texas, Atlantic Coast Line, Southern Railway, Northern Pacific, Great Northern, and Chicago & North Western. The St. Paul management has obtained results which compare very favorably with those of the other carriers mentioned, in car-loading, train-loading, average miles per freight car per day, and unit cost of transportation. Compared with other representative roads in the Northwest the St. Paul is above the average. Few excel it in efficiency, and those only slightly. Every test of importance shows that for a number of years past the St. Paul has been most efficiently managed.

Insufficient Freight Rates.—The average revenues per ton-mile of the St. Paul have been, and are, materially lower than those of many carriers in other territories; in fact this is true of all the principal carriers in the northwestern territory.

To the report there are appended 15 exhibits giving figures of traffic, operating costs and rates for the St. Paul as compared with the Santa Fe and other railroads. Included also are comparisons of the earnings per ton-mile of the St. Paul with those of the Frisco, the Katy, the Atlantic Coast Line and the Southern. One of the exhibits shows that if the St. Paul had had in 1924 the same earnings per ton-mile as the Frisco it would have earned 13.3 per cent on all its stock; as the Katy, 12.8 per cent; as the Atlantic Coast Line, 19.5 per cent, and as the Southern 9.8 per cent. In 1924, the St. Paul actually did earn but 91.5 per cent of its fixed charges.

"Stated in another way—on the St. Paul's lower basis of freight rates, the St. Louis-San Francisco would have earned only 73 per cent of fixed interest, and only 48 per cent of all charges; the Missouri-Kansas-Texas only 89 per cent of fixed interest, and only 56 per cent of all charges; the Atlantic Coast Line only 60 per cent of all charges, and the Southern 104 per cent of all charges, instead of the 203 per cent actually earned.

"We believe that these comparisons clearly demonstrate that the inferiority of the St. Paul, as contrasted with the four roads mentioned, is in the matter of freight rates alone, and that had the St. Paul been accorded a fair and proper basis of freight rates, its property would not be in receivership today."

Potter Defends Rate Pool Plan.—Mark W. Potter, former Interstate Commerce Commissioner and one of the receivers of the St. Paul, has issued a statement discussing in further detail the plan outlined recently by the receivers for the pooling of the proceeds of freight rate increases in the western district (reported in the *Railway Age* of June 27). He states that the plan is "a logical step in carrying out the purposes of the Transportation Act," and "which the decisions of the Supreme Court warrant, and which they indicate will be sustained." The statement continues:

"It applies the lessons to be learned from the court's interpretation of the Transportation Act in the New England divisions case, the Dayton-Goose Creek case, the Wisconsin rate case, and other cases where the court has reiterated the statement of the purpose of the Transportation Act to be to sustain transportation throughout the nation in fairness to all.

"It is to be noted that the transportation act provides for the recapture of excess earnings. This provision of the law has been sustained by the Supreme Court. The law contemplates that such recaptured excess earnings shall be used to assist needy carriers. Unfortunately the recapture provisions have not yet proved workable. They provide for a recovery of a portion of the excess beyond a fair return on value. Values are to be determined by the commission. They have not been determined. Serious questions are in dispute among carriers and the commission as to how values shall be determined. There is no prospect of an early determination

of those principles. Years must elapse before the roads can be valued. The recapture provisions of the act, while recognizing that surplus revenues of prosperous carriers shall be made available for those less prosperous, cannot be relied upon to accomplish their purpose and to serve the existing pressing need."

CHICAGO, ROCK ISLAND & PACIFIC.—Equipment Trusts Sold.—Speyer & Co. and Dillon, Read & Co. have sold at prices to yield from 4.25 per cent to 4.80 per cent, according to maturity, \$5,400,000 4½ per cent equipment trust certificates, series "N." The certificates are dated August 1, 1925, and are due in annual installments of \$360,000 each August 1 from 1926 to 1940, inclusive.

CHICAGO, SPRINGFIELD & ST. LOUIS.—Acquisition.—This company has applied to the Interstate Commerce Commission for authority to acquire and operate the line formerly owned by the Chicago, Peoria & St. Louis from Springfield to Lock Haven, Ill., 78.78 miles.

CLEVELAND UNION TERMINALS.—Bonds Authorized.—The Interstate Commerce Commission has granted authority to this company to issue not exceeding \$15,000,000 first mortgage sinking fund bonds, series B, to be sold at not less than 98.21 per cent of par and accrued interest and the proceeds to be used for construction purposes. Authority was also granted to the New York Central, the Cleveland, Cincinnati, Chicago & St. Louis, and the New York, Chicago & St. Louis to assume obligation and liability as guarantors with respect to the bonds. The company proposed to sell the bonds at not less than 97 and accrued interest, which would have made the annual cost to the company approximately 5.17 per cent. The price of 98.21, fixed as a minimum price by the commission, makes the annual cost about 5.10 per cent. Commissioner Eastman dissented, basing his dissent on the views which he expressed in the case of the New York Central Lines' equipment trust certificates. He said:

"While that case dealt with equipment trust certificates, the securities here involved are just as appropriate a subject for competitive bidding. Bonds of a terminal company located in the city of Cleveland, unconditionally guaranteed, jointly and severally, by the New York Central, Big Four and Nickel Plate are not securities which can defensibly be sold without such bidding to a preferred banking house."

DALLAS, CLEBURNE & SOUTHWESTERN.—Abandonment.—The Interstate Commerce Commission has authorized this company to abandon its line from Cleburne, Tex., to Egan, 9.82 miles. This line was leased by the Missouri-Kansas-Texas of Texas but was not taken over in the reorganization. It ceased operation on June 30, 1923.

DETROIT, GRAND HAVEN & MILWAUKEE.—Tentative Valuation.—The Interstate Commerce Commission has issued a tentative valuation report as of June 30, 1917, in which the final value for rate-making purposes of the property owned is placed at \$11,042,500 and that of the property used at \$13,517,650. The outstanding capitalization was \$7,239,736 and the book investment in road and equipment was \$7,219,472.

DETROIT, TOLEDO & IRONTON.—Guaranty.—The Interstate Commerce Commission has issued a final certificate placing the amount of this company's guaranty for the six months following the termination of federal control at \$285,621, of which \$60,621 was to be paid on the final certificate.

FRANKFORT & CINCINNATI.—Tentative Valuation.—The Interstate Commerce Commission has issued a tentative valuation report as of June 30, 1917, placing the final value for rate-making purposes of the property owned and used for carrier purposes at \$1,182,950.

GOLDEN BELT OF KANSAS.—Authority to Issue Bonds Denied.—The Interstate Commerce Commission has dismissed the application of this company for authority to issue \$800,000 stock and \$500,000 bonds. The company desired to build a railroad from Great Bend, Kans., to Hays but a certificate of public convenience and necessity was refused.

HOCKING VALLEY.—Minority Stockholders Lose.—Minority stockholders lost in their action to prevent the Hocking Valley from entering the Nickel Plate System when Judge Daniel H. Sowers of the Franklin County Common Pleas Court at Columbus, Ohio, sustained on June 27 a demurrer to the petition filed several months ago to prevent the merger. The petition was dismissed mainly on the ground that the relief sought by the stockholders is

(Continued on Page 65)

Annual Reports

The Baltimore & Ohio Railroad Company

Synopsis of Annual Report, Calendar Year 1924

The Annual Report for the calendar year 1924, which the President and Directors of The Baltimore and Ohio Railroad Company submit today to the Stockholders of the Company, marks the ninety-eighth year of the Railroad Company's existence.

The operated mileage of the Company is 5,196 miles. Including 104 miles of subsidiary companies, the first main track mileage is 5,300 miles and the total mileage of all tracks 10,699 miles. In addition the Company exercises trackage rights for passenger traffic only from Philadelphia to New York, a distance of 97 miles.

The Company's equipment, valued at \$199,329,764, consists of 2,585 steam locomotives, 11 electric locomotives, 100,092 freight cars, 1,441 passenger cars, 3,202 work equipment units and 179 marine equipment units.

The recorded investment at December 31, 1924, of the property devoted to and used in transportation service is \$773,814,915, an increase over the previous year of \$20,684,074.

Owing to the general decline in business during the year 1924, the revenues of the Company were diminished, compared with the peak year of 1923 when the Company handled the largest volume of freight traffic in its history. But the loss in revenue in 1924 was overcome to a considerable extent by operating economies, resulting in the largest net railway operating income heretofore earned with the single exception of the year 1923.

With the exception of products of agriculture, which showed a slight increase, the decrease in traffic was general. Especially notable was the large decrease in bituminous coal, which is the largest single item of traffic handled by the Company. The explanation for this decrease, however, lies in the fact that the bituminous coal industry in the Northern bituminous coal fields has been handicapped in the Eastern markets by the lower mining costs prevailing in the Southern or Pocahontas, New River and other fields. This condition was partly offset by the Company handling a larger proportion of coal traffic from connecting lines and finding a market for it on or via its lines. Notwithstanding the reduction in coal traffic, the revenues of the Company were generally sustained owing to increased commercial and industrial activities in the territory served by its lines.

Gross revenues of the Company amounted to \$224,318,794, divided into freight revenue, \$180,179,357; passenger revenue, \$29,047,718, and other revenue, \$15,091,719. With the exception of 1920, and the peak year, 1923, the gross revenues were the largest in the history of the Company.

Even with the decline in traffic during 1924, compared with 1923, the Company was able to make material decreases in operating expenses. In expenditures for maintenance of way and structures, it showed a decrease of \$2,680,337. Expenses for maintenance of equipment were \$15,221,968 below the same figures for 1923. Transportation expenses in 1924 were \$9,362,906 less than in 1923, while the total of all operating charges for the year was \$172,752,632, a decrease of \$26,571,329.

Railway tax accruals, amounting to \$9,548,085, absorbed 18½ cents of every dollar of operating revenues remaining after the payment of operating expenses, and railway tax accruals and miscellaneous tax accruals combined, nearly equalled the amount paid during the year for dividends on the preferred and common stock of the Company, or nearly \$9,951,864.

The Company's net railway operating income for 1924 was \$38,084,323, as compared with \$42,133,129 in 1923, a decrease of \$4,048,805 or 9.61 per cent and was equivalent to a return of 4.92 per cent upon the investment in property devoted to transportation service. Under the Transportation Act of 1920, properties under common control and management may be combined for the purpose of determining recapturable income. Consolidating the separately operated subsidiaries with the parent company the net railway operating income of the entire system was \$38,245,514, equivalent to 4.67 per cent on the combined investment in property used in transportation service.

There was a decrease of \$375,230 in "Other income" during the year, due in part to the sale of certain railroad properties located in Kentucky, the net income from which was previously absorbed by the Company. The increase of \$1,678,309 in "Deductions from gross income," was due largely to increased interest charges occasioned by the issue of new and the refunding of old securities which were part of the large financing arranged by the Company during the year.

On the whole, the financial results were satisfactory. Net railway operating income, that is, the amount earned in the actual operations of the railroad property was

while the return from other investments was.....\$ 5,657,290

making a total income of\$43,741,613
from which were deducted fixed charges, etc.\$27,421,924

leaving a balance of\$16,319,689
and after payment of dividends on the preferred stock of \$ 2,354,527

there remained\$13,965,162

showing an earning of 9.19 per cent on the outstanding common stock of the Company. Quarterly dividends were maintained throughout the year at the rate of 4 per cent per annum on the preferred stock and 5 per cent per annum on the common stock.

The Company controls through ownership of the entire capital stock the following railroads:

The Baltimore and Ohio Chicago Terminal Railroad
Company81 miles
The Staten Island Rapid Transit Company.....23 miles

Total..... 104 miles

These properties, while separately operated, are component parts of the System and the net result of the operations is absorbed in the general or combined income account of the Company, so that the net income is from the operations of all the properties comprising the Baltimore and Ohio System.

On June 17, 1924, the Interstate Commerce Commission authorized the Company to issue and sell \$35,000,000 of its Refunding and General Mortgage Series "C" 6 per cent bonds. Of these bonds \$30,000,000 were drawn to recoup the Company for expenditures previously made for additions and betterments and for other property coming under the mortgage, the remaining \$5,000,000 being issued to retire a like amount of outstanding obligations.

Anticipating the refunding of a part of the \$131,125,280 of bonds maturing in 1925, of which \$120,000,000 become due on July 1st, the Company took advantage of favorable money conditions and in August, 1924, with the authority of the Interstate Commerce Commission, issued and sold \$75,000,000 of its First Mortgage Bonds, bearing interest at 5 per cent per annum. This action was taken to retire at or before maturity an equal amount of the Company's Prior Lien 3½ per cent bonds, maturing July 1, 1925. A substantial amount of these bonds had been retired by the end of 1924. The First Mortgage bonds so issued were specifically reserved under that mortgage to retire the Prior Lien bonds upon maturity.

Financing conditions continued favorable and the Company, with the approval of the Interstate Commerce Commission, called for redemption and retirement November 1, 1924, \$5,720,000 of 7 per cent Preferred Lien Equipment Certificates and \$3,813,333 of 6 per cent Deferred Lien Equipment Certificates through the issue and sale of \$9,504,000 of new 4½ per cent Equipment Certificates issued under the National Railway Service Corporation Equipment Trust. This will result in a net saving to the Company in interest and other charges of approximately \$50,000 per annum for the duration of the trust.

Total of new debt incurred\$119,504,000
Total of old debt retired..... 76,569,835

Net increase in long term debt.....\$ 42,934,165
Less further provisions for retirement of obligations at or before maturity\$ 28,332,725

Leaving the actual net increase in long term debt..\$ 14,601,440

In April, 1925, the Company also concluded arrangements for extending, on advantageous terms, \$45,000,000 of its Southwestern Division Bonds coming due July 1, 1925, so that provision has now been made for all the obligations of the Company which mature in 1925.

The Company continued its program of betterment and enlargement of the property, and in addition added the following equipment: 73 locomotives, 55 passenger cars, 3,386 freight cars, 15 pieces of work equipment and 8 car floats and lighters, having a value of \$12,900,155. Equipment retired from the service during 1924 had a book value of \$3,160,449 and in making changes from one class to another, there was also a reduction in the book value of equipment of \$174,773, making the net increase in investment value of equipment \$9,564,932 for the year.

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The Company has been experimenting with gasoline motors as substitutes for steam locomotives on branch lines and the Management is convinced that substantial economies will ultimately be realized from such changes, at the same time improving service to the public.

The total net increase in investment in property held for and used in the service of transportation, was:

Additions and Betterments to Road.....	\$11,178,733
Additions and Betterments to Equipment.....	9,564,932
	<hr/>
	\$20,743,665
Less—Net decrease in other accounts.....	59,591

Net Increase.....\$20,684,074

Principal among the improvements to the property was the completion of the huge concrete grain elevator and terminal facilities, at Locust Point, Baltimore, Md. The elevator is of modern type, embodying the latest development in such construction and operation, having a storage capacity of 3,800,000 bushels. Its unloading capacity is 32 cars an hour. As auxiliaries to the elevator, the new grain pier No. 7 has been finished and the combined grain and general cargo pier No. 6 has also been completed, both of which are connected with the elevator by long steel grain galleries equipped with belt conveyors. The loading capacity of the two piers is 150,000 bushels an hour. Another large improvement completed during the year was the Millvale-Etna double track elevated line, 2.16 miles in length, enabling the Company to be independent of the use of tracks of other companies in Pittsburgh.

Grade crossing elimination continued. At Feltonville, Pa., Martinsburg, W. Va., Salisbury Jct., Pa., Taylorstown, Pa., and New Castle, Pa., such improvements were completed and at Silver Spring, Md., similar work is well under way, while agreements have been reached for the separation of grades at Cambridge and Mansfield, Ohio. New pumping stations were erected at Connells-ville, Pa., and Bridgeport, Ohio. Water treating plants were installed at these points and also at Rossford, Tontogany, Lima, Wapakoneta, Sidney, Troy, North Dayton, East Dayton and Old River Junction, Ohio, and a new dam and reservoir were finished at Somerset, Pa.

Bridge work continued to progress, resulting in extending the use of heavier power on several divisions. The largest improvement of this kind was the construction of a modern bridge over the Kanawha River, at Parkersburg, W. Va. Passing sidings were extended at Beckemeyer, Lebanon and Caseyville, Ill., and a new 80 car length siding was completed at O'Fallon, Ill.

Complying with the law of the State of New York, requiring the use of electric motive power in the operation of all trains in cities with inhabitants of 1,000,000 or more, the Company has undertaken through its subsidiary, the Staten Island Rapid Transit Company, to electrify the line between St. George and South Beach and between Clifton Junction and Tottenville, located on Staten Island, N. Y., a distance of 16.9 miles. Satisfactory progress has been made upon this work, the cost of which, together with the cost of the new all steel passenger equipment, will be approximately \$5,000,000. This will be advanced by the Company.

In connection with the valuation of railroads, no tentative or final valuation has yet been served upon the Company or any of its constituent or subsidiary companies, but for the valuation of the Company's property there has been expended and charged to operating expenses \$3,861,608, up to December 31, 1924.

The Commercial Development Department during the year 1924, was instrumental in locating on the lines of the Company 419 new industries and 48 expansions of existing plants, representing a total plant investment in excess of \$38,000,000. Through this department, the Company also conducted a soil fertility program over its entire system, in co-operation with Extension Bureaus of State Colleges and County Agents. As another aid to agriculture in its territory, the Company operated better dairy sire trains, pure-bred ram sales, organized poultry clubs, etc., and co-operated in farm educational work through boys and girls clubs in states through which it operates. In the last three years the Baltimore and Ohio awarded 37 scholarships permitting winners the alternative of university training or educational trips.

There were 63,939 employees in the service of the Company at December 31, 1924, of which 54,706 were members of the Relief Department.

Pension payments to retired employees, while administered through the officers of the Relief Department, are made wholly by the Company and constitute a special pay roll. The number of pensioners on this roll at the end of 1924 was 1,290, a net increase of 16 for the year. Pension payments for 1924 amounted to \$456,885, an increase of \$21,382 over the previous year. Since the inauguration of the Pension Feature in October, 1884, the Company has paid \$5,930,491 account of pensions to superannuated employees.

During the year the Baltimore and Ohio Company was able to furnish and did furnish, adequate, efficient and satisfactory service to its patrons, and the friendly relationship between the Company and the communities which it serves has been strengthened. Public Relations Committees of Baltimore and Ohio officers and employees

have been organized in 158 of the Counties which are reached by Baltimore and Ohio rails, for the particular purpose of developing a better understanding between the Company and those who depend upon it for transportation. Meetings between these committees and groups of local representatives are held at frequent intervals and much good has already been accomplished by such conferences.

The policy of co-operation between the Baltimore and Ohio management and employees has been extended and further developed during the year. Practices and methods have been put in effect whereunder different groups of employees and officers meet in conference at least once and in many cases twice each month. At such conferences a free expression of views is encouraged, and many valuable and constructive suggestions have been made by men in all branches of the service. It should be said in this connection that the officers of the several labor organizations with which most of the men are affiliated, have been sympathetic with this policy and their co-operation has been very helpful.

There were 32,174 stockholders of the Company of record on December 31, 1924.

The Board takes pleasure in recording its appreciation of the loyal and efficient co-operation of officers and employees during the year, and is desirous that this sympathetic understanding and relationship now existing may be continued.

DANIEL WILLARD,
President.

THE BALTIMORE AND OHIO RAILROAD COMPANY

Income Account			
INCOME ACCOUNT.	Year 1924.	Year 1923.	Increase or Decrease.
Average Miles Operated....	*5,196.18	*5,206.87	—10.69
RAILWAY OPERATING REVENUES:			
Freight	\$180,179,357.18	\$208,587,996.20	—\$28,408,639.02
Passenger	29,047,718.38	30,752,790.80	—1,705,072.42
Mail	2,709,836.58	2,526,213.34	183,623.24
Express	4,786,832.49	4,992,622.90	—205,790.41
Other transportation revenue	3,451,561.02	3,535,610.59	—84,049.57
Miscellaneous revenue....	4,143,489.20	5,199,201.43	—1,055,712.23
Total railway operating revenues	\$224,318,794.85	\$255,594,435.26	—\$31,275,640.41
RAILWAY OPERATING EXPENSES:			
Maintenance of way and structures	\$26,638,363.05	\$29,318,700.72	—\$2,680,337.67
Maintenance of equipment	48,659,503.96	63,881,472.30	—15,221,968.34
Traffic	4,242,473.18	3,916,435.76	326,037.42
Transportation	85,313,754.95	94,676,661.15	—9,362,906.20
Miscellaneous operations..	1,789,046.20	1,653,199.60	135,846.60
General	6,169,512.10	5,917,658.45	251,853.65
Transportation for investment—Credit	60,021.07	40,166.55	—19,854.52
Total railway operating expenses	\$172,752,632.37	\$199,323,961.43	—\$26,571,329.06
Net Revenue from Railway Operations	\$51,566,162.48	\$56,270,473.83	—\$4,704,311.35
Ratio of operating expenses to operating revenues....	77.01%	77.98%	.97%
OTHER OPERATING CHARGES:			
Railway tax accruals....	\$9,548,085.84	\$9,834,128.86	—\$286,043.02
Uncollectible railway revenues	103,073.34	131,286.01	—28,212.67
Equipment rents—Net debit	2,956,054.86	3,139,711.37	—183,656.51
Joint facility rents—Net debit	874,624.80	1,032,218.29	—157,593.49
Total other operating charges	\$13,481,838.84	\$14,137,344.53	—\$655,505.69
Net Railway Operating Income as Defined in the Transportation Act of 1920	\$38,084,323.64	\$42,133,129.30	—\$4,048,805.66
OTHER INCOME:			
Income from lease of road	\$16,147.30	\$17,144.80	—\$997.50
Miscellaneous rent income	1,020,084.00	968,560.11	51,523.89
Miscellaneous non-operating physical property....	321,021.27	213,044.90	107,976.37
Separately operated properties—Profit .....	.....	296,451.94	—296,451.94
Dividend income	1,910,941.92	1,914,723.50	—3,781.58
Income from funded securities	1,528,263.77	1,628,601.42	—100,337.65
Income from unfunded securities and accounts....	672,831.62	902,393.38	—229,561.76
Income from sinking and other reserve funds....	163,083.03	67,450.45	95,632.58
Miscellaneous income	24,916.77	24,149.84	766.93
Total other income.....	\$5,657,289.68	\$6,032,520.34	—\$375,230.66
Gross Income	\$43,741,613.32	\$48,165,649.64	—\$4,424,036.32

*Excludes the 96.71 miles of passenger trackage rights between Philadelphia and New York.

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	Year 1924.	Year 1923.	Increase or Decrease.
Gross Income, carried f'w'd	\$43,741,613.32	\$48,165,649.64	—\$4,424,036.32
DEDUCTIONS FROM GROSS INCOME:			
Rent for leased roads....	\$604,452.84	\$394,266.38	\$210,186.46
Miscellaneous rents	270,428.92	519,196.36	—248,767.44
Miscellaneous tax accruals	248,370.45	279,576.96	—31,206.51
Separately operated prop- erties—Loss	1,040,171.00	794,285.78	245,885.22
Interest on funded debt....	24,950,935.43	23,333,142.78	1,617,792.65
Interest on unfunded debt	190,474.13	304,519.52	—114,045.39
Miscellaneous income charges	117,090.93	118,625.96	—1,535.03
Total deductions from gross income	\$27,421,923.70	\$25,743,613.74	\$1,678,309.96
Net Income	\$16,319,689.62	\$22,422,035.90	—\$6,102,346.28

Surplus Account.

PROFIT AND LOSS ACCOUNT:			
Credit balance, December 31, 1923.....			\$32,223,524.35
Net income for year 1924.....	\$16,319,689.62		
Miscellaneous adjustments—Net debit.....	4,636,191.45		11,683,498.17
Total			\$43,907,022.52
Appropriations during year 1924.			
Income applied to sinking and other reserve funds		\$216,130.70	
Dividends on preferred stock at 4 per cent. per annum		2,354,527.24	
Dividends on common stock at 5 per cent. per annum		7,597,337.42	10,167,995.36
Credit balance December 31, 1924.....			\$33,739,027.16

ADDITIONS TO PROPERTY THROUGH INCOME AND SURPLUS:

Credit balance, December 31, 1923.....	\$26,307,730.70		
Miscellaneous	209,702.48		
Credit balance December 31, 1924.....		26,517,433.18	

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SINKING FUND RESERVES:

Credit balance December 31, 1923.....	\$193,845.84
Additions during year.....	13,376.95
Credit balance December 31, 1924.....	207,220.79

TOTAL CORPORATE SURPLUS, credit balance December 31, 1924. \$60,463,681.13

Condensed General Balance Sheet.

	Year 1924	Increase or Decrease.
ASSETS:		
Investment in Road and Equipment....	\$460,221,933.46	
Investment in Constituent Companies....	307,151,781.69	
Investment in Perpetual Leaseholds— (per contra)	6,441,200.00	
Total Property Investment.....	\$773,814,915.15	\$20,684,074.78 Inc.
Other Investments	75,851,319.80	600,335.59 Inc.
Total Investments	\$849,666,234.95	\$21,284,410.37 Inc.
Current Assets—Cash, Materials and Sup- plies, etc.	90,290,539.25	21,971,877.89 Inc.
Deferred Assets	1,056,724.46	79,720.22 Inc.
Unadjusted Debits	1,567,801.92	946,640.58 Dec.
	\$942,581,300.52	\$42,389,367.90 Inc.
LIABILITIES.		
Common Stock	\$151,945,428.54	
Preferred Stock	58,863,180.95	
Total Stock Outstanding.....	\$210,808,609.49	
Funded Debt	\$74,004,137.35	\$42,934,165.33 Inc.
Capitalized Leaseholds—(per contra)....	6,436,200.00	
Total Capital and Leasehold Obliga- tions	\$791,248,946.84	\$42,934,165.33 Inc.
Current Liabilities	31,166,854.61	3,655,592.25 Dec.
Deferred Liabilities	1,830,550.63	856,403.96 Dec.
Unadjusted Credits—Accrued Deprecia- tion, Reserves, etc.	57,871,267.31	2,228,616.54 Inc.
Corporate Surplus	60,463,681.13	1,738,582.24 Inc.
	\$942,581,300.52	\$42,389,367.90 Inc.

Northern Pacific Railway Company

Twenty-Eighth Annual Report for the Year Ending December 31, 1924

Office of the
NORTHERN PACIFIC RAILWAY COMPANY,
St. Paul, Minnesota.

May 5, 1925.

To the Stockholders of the

Northern Pacific Railway Company:

The following, being the twenty-eighth annual report, shows the result of the operation of your property for the year ending December 31, 1924.

Income Account

	1924	1923	Increase— Decrease—D
Average mileage operated...	6,679.94	6,668.99	I 10.95
Operating Income.			
Operating revenues (see page 26)	\$95,292,403.75	\$102,002,059.86	D \$6,709,656.11
Operating expenses (see pages 28 and 29)	70,533,064.17	80,364,809.90	D 9,831,745.73
Net operating revenue....	\$24,759,339.58	\$21,637,249.96	I \$3,122,089.62
Railway tax accruals.....	8,546,757.71	8,462,890.56	I 83,867.15
Uncollectible railway revenues	16,396.34	19,428.60	D 3,032.26
Railway operating income....	\$16,196,185.53	\$13,154,930.80	I \$3,041,254.73
Equipment rents—net	2,130,762.83	2,404,237.63	D 273,474.80
Joint facility rent—net.....	1,534,128.42	1,541,388.53	D 7,260.11
Net railway operating in- come	\$19,861,076.78	\$17,100,556.96	I \$2,760,519.82
Nonoperating Income.			
Income from lease of road....	\$341,310.21	\$341,649.40	D \$339.19
Miscellaneous rent income....	744,514.14	716,274.96	I 28,239.18
Miscellaneous nonoperating physical property.....	64,720.76	73,585.35	D 8,864.59
Dividend income.....	9,333,498.51	8,339,695.33	I 993,803.18
Income from funded securities	833,603.83	1,393,068.02	D 559,464.19
Income from unfunded secur- ities and accounts.....	295,810.26	315,901.73	D 20,091.47
Income from sinking and other reserve funds.....	178.10	178.10	
Miscellaneous income	130,025.99	1,322.94	D 131,348.93
Total nonoperating income....	\$11,483,431.72	\$11,181,675.83	I \$301,755.89
Gross income.....	\$31,344,508.50	\$28,282,232.79	I \$3,062,275.71

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	1924	1923	Increase— Decrease—D
Deductions from Gross Income			
Rent for leased roads.....	\$51,320.66	\$51,320.66	
Miscellaneous rents.....	13,401.28	10,265.24	I \$3,136.04
Interest on funded debt....	14,767,618.76	14,707,679.49	I 59,939.27
Interest on unfunded debt...	297,459.35	258,855.43	I 38,603.92
Amortization of discount on funded debt.....	20,938.00	22,771.75	D 1,833.75
Miscellaneous income charges	223,526.32	249,914.34	D 26,388.02
Total deductions from gross income	\$15,374,264.37	\$15,300,806.91	I \$73,457.46
Net income	\$15,970,244.13	\$12,981,425.88	I \$2,988,818.25
Dividend appropriations of in- come	12,400,000.00	12,400,000.00	
Income balance of the year transferred to profit and loss.....	\$3,570,244.13	\$581,425.88	I \$2,988,818.25

Revenue Train Mileage

Revenue freight and mixed train miles during the year were 10,032,547, a decrease of 1,090,243 miles, or 9.80 per cent.

Revenue passenger train miles during the year were 9,602,048, a decrease of 151,583 miles, or 1.55 per cent.

Revenue special train miles during the year were 6,753, an increase of 668 miles, or 10.98 per cent.

All revenue train miles during the year were 19,641,348, a decrease of 1,241,158 train miles, or 5.94 per cent.

Earnings

Freight Business.

Freight revenue was \$73,422,540.29, a decrease of \$4,188,029.67, or 5.40 per cent.

The number of tons of revenue freight carried was 23,991,532, a decrease of 141,469, or .59 per cent.

6,548,671,158 tons of revenue freight were moved one mile, a decrease of 305,665,621 tons one mile, or 4.46 per cent.

The average earnings per ton mile decreased from 1.132 cents to 1.121 cents.

The revenue train load increased from 622.67 to 658.64 tons. The

total train load, including company freight, increased from 732.07 to 752.87 tons.

The number of miles run by revenue freight trains was 9,376,640, a decrease of 1,095,124, or 10.46 per cent.

Passenger Business

Passenger revenue was \$13,167,941.74, a decrease of \$2,270,842.37 or 14.71 per cent.

Mail revenue was \$1,726,711.82, an increase of \$66,596.36, or 4.01 per cent.

Express revenue was \$2,033,957.47, a decrease of \$25,491.60, or 1.24 per cent.

Sleeping car, parlor and chair car, excess baggage and miscellaneous passenger revenue was \$1,076,248.97 an increase of \$1,047.17, or .10 per cent.

Total revenue from persons and property carried on passenger and special trains was \$18,004,860.00, a decrease of \$2,228,690.44, or 11.01 per cent.

The number of passengers carried was 3,607,987, a decrease of 1,098,541, or 23.34 per cent from the previous year, and the number of passengers carried one mile was 413,116,915, a decrease of 66,398,216, or 13.85 per cent.

The number of miles run by revenue passenger trains was 9,602,048, a decrease of 151,583, or 1.55 per cent.

The average rate per passenger mile was 3.187 cents against 3.220 cents in 1923.

	1924	1923	Increase— Decrease—D
Number of cars requiring heavy repairs.....	1,312	1,530	I 382
Percentage of total cars on line.....	4.19	3.27	I .92
Number of cars requiring light repairs.....	1,275	635	I 640
Percentage of total cars on line.....	2.79	1.36	I 1.43

Maintenance of Way and Structures

The charges for maintenance of way and structures were \$12,240,855.11, a decrease of \$1,781,838.50, or 12.71 per cent. Because of the increasing weight of locomotives and cars the Company has adopted 100 pound rail as its standard for main line, and 130 pound rail for very heavy curves and mountain grades.

Bridges

During the year 98 bridges were replaced of which 53 bridges, 14,160 lineal feet in length, were replaced by timber structures and 2 permanent and 43 timber structures were replaced in permanent form, as follows:

Replaced by embankment.....	32 bridges, 5,378 lineal feet
Replaced by steel viaduct, steel truss, girder, I-beam and reinforced concrete trestle.....	13 bridges, 1,517 lineal feet

Total 45 bridges, 6,895 lineal feet

In addition to changes referred to above, 2 permanent and 10 temporary bridges were abandoned, 10 permanent and 35 temporary bridges were added and 166 culverts were rebuilt, 41 in temporary and 125 in permanent form.

Earnings and Expenses Per Mile Operated

	1917	1920	1921	1922	1923	1924
Operating revenues per mile.....	\$13,526.37	\$16,996.59	\$14,199.10	\$14,467.89	\$15,294.98	\$14,265.46
Operating expenses per mile.....	8,171.39	15,177.88	11,659.73	10,940.92	12,050.52	10,558.94
Net operating revenue per mile.....	5,354.98	1,818.71	2,539.37	3,526.97	3,244.46	3,706.52
Taxes per mile.....	1,059.52	1,519.34	1,353.87	1,269.54	1,268.99	1,279.47
Net	\$4,295.46	\$299.37	\$1,185.50	\$2,257.43	\$1,975.47	\$2,427.05

RATIOS.

	1917	1920	1921	1922	1923	1924
Operating expenses to operating revenue.....	60.41%	89.30%	82.12%	75.62%	78.79%	74.02%
Transportation expenses to operating revenue.....	32.34%	42.84%	37.87%	38.31%	37.78%	35.88%
Taxes to operating revenue.....	7.83%	8.94%	9.53%	8.77%	8.30%	8.97%

Transportation—Rail Line

The charges of transportation expenses were \$34,190,334.35, a decrease of \$4,345,083.07, or 11.28 per cent, as against a decrease in total operating revenue of 6.58 per cent.

Maintenance of Equipment

The charges for maintenance of equipment were \$18,675,927.20, a decrease of \$3,788,414.54, or 16.86 per cent. Of the total amount \$3,816,541.18 represents depreciation, accrued at the rate of 4 per cent.

Locomotives

Hauling Capacity

	Number	Tractive power (Pounds)	Total weight on drivers (Pounds)	Total weight of locomotives (Pounds)
Assignment December 31, 1923...	1,426	54,090,070	242,633,926	310,457,586
Added during year.....		79,280	84,500	135,300
Total	1,426	54,169,350	242,718,426	310,592,886
Locomotives sold and withdrawn from service.....	9	196,900	945,237	1,091,512
Total	1,417	53,972,450	241,773,189	309,501,374

*Account compound engines changed to simple, application of superheaters and cross compound pumps, changes in size of cylinders and increased boiler pressure.

Condition	December 31, 1924		December 31, 1923	
	Number	Per cent	Number	Per cent
Good	1,168	82.43	1,169	81.98
Fair	66	4.66	87	6.10
At shops or awaiting shop.....	92	6.49	146	10.24
Unserviceable, awaiting disposition (see note)	91	6.42	24	1.68
	1,417	100.00	1,426	100.00
Number of oil burning locomotives.....	71	5.01	60	4.21
Number of locomotives equipped with superheaters	744	52.51	714	50.07
Number of locomotives equipped with stokers	178	12.56	136	9.54

Notes—Included in the 91 locomotives shown as unserviceable, awaiting disposition, are 31 that are being withdrawn from active service and are being sold, dismantled or otherwise disposed of.

Freight Car Situation on December 31st

	1924	1923	Increase— Decrease—D
N. P. cars on line.....	35,605	35,197	I 408
Foreign cars on line.....	10,030	11,544	D 1,514
Total cars on line.....	45,635	46,741	D 1,106
N. P. cars on foreign lines.....	12,095	11,791	I 304
Number of cars unserviceable.....	3,187	2,165	I 1,022
Percentage of unserviceable to total cars on line	6.98	4.63	I 2.35

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There are now under construction 775 lineal feet of steel truss for single track, 455 lineal feet of girder and I-beam spans for single track, and 293 lineal feet of reinforced concrete trestle for single track.

Bridges as they existed December 31, 1924.

Description	Number	Lineal feet	Miles
Steel, iron, stone and concrete permanent bridges.....	821	146,547	27.75
Timber and combination iron and timber structures.....	2,515	372,349	70.52
Total	3,336	518,896	98.27

Total length of timber structures replaced by steel bridges, embankments or other permanent form from July 1, 1885, when work was commenced, to December 31, 1924, 146.32 miles.

Buildings or Stations.

New buildings and structures or increased facilities have been provided at the following stations:

Minnesota: Brainerd, Clear Lake, Dilworth, Duluth, Northtown, Red Lake Falls, St. Paul, Staples.

North Dakota: Deapolis, Jamestown.

Montana: Missoula.

Washington: Grandview, Hoquiam, Lester, McCormick, Nisqually, Sawyer, South Tacoma, Seattle, Sedro-Woolley, Tacoma, Walla Walla.

Water Supply.

New or additional water facilities have been provided at following points:

Minnesota: Morris, St. Paul.

North Dakota: Chasceley, Holliday, Zap.

Washington: Aberdeen, Puyallup River Junction.

Roadway Buildings.

Section houses were provided at Beulah, North Dakota, and Ostrander, Washington.

Block Signals and Interlockers

Minnesota: Automatic block signal installation between Little Falls and Staples was completed and placed in service on September 15, 1924.

In connection with the line change around the Campus of the University of Minnesota, a new interlocking plant was placed in service on February 27, 1924, at 18th Avenue S. E., Minneapolis, and old plant at Washington Avenue abandoned.

North Dakota: On April 7, 1924, contract was made with the Sprague Safety Control & Signal Corporation for the installation of automatic train control between Mandan and Dickinson, N. D., as required by Interstate Commerce Commission Order No. 13413. Twenty-one miles of roadway apparatus have been installed and six engines have been equipped and tests are now in progress.

Line Changes

Minnesota: The work of elevating tracks between Johnson Street and Lowry Avenue on Line B in Northeast Minneapolis was continued during the year. The bridges carrying the railway tracks over Central Avenue, 18th Avenue, Monroe and 19th Avenue have been completed and temporary approach grades placed at either end of the completed section. In 1925 the separation of grades will be made at Johnson Street on Line B and the Pocket Yard track including the raising of the west end of the East Minneapolis yard.

Miscellaneous

The Rosebud Branch was completed and turned over for operation September 1, 1924.

An extension of the Elma Branch to Shelton in the State of Washington was authorized. This involves the rehabilitation of the Port Blakely Mill Company's line from Stimson to Kamilche, a distance of 7.71 miles, which line was acquired by your company, and the construction of a new line from Kamilche to Shelton, a distance of 8 miles. Surveys have been completed and contract for construction was let December 10, 1924, and the work is now in progress.

The work of reconstructing bridges 15 over Cabin Creek, 78 over Tongue River, 167.1 over the Big Horn River, and the lengthening of bridge 47 over the Powder River was undertaken during the year and will be completed early in 1925. The reconstruction of these bridges eliminates all bridge restrictions for heavy power on the Yellowstone Division, 3rd and 4th Districts. This permits the assignment of Class "W" engines in place of Class "T," and increases westbound tonnage rating 800 tons per train and eastbound 1000 tons per train.

General

Financial Results of Operation.

The operation of your property, after all charges, resulted in net income of \$15,970,244.13, an increase of \$2,988,818.25. As in past years the volume of passenger business shows a large decrease, due chiefly to the competition of the automobile and motor bus. There was a slight decrease in the average rate per passenger mile, but an increase in the average distance traveled, so that while the number of passengers carried shows a decrease of 23.34 per cent, the decrease in number of passengers carried one mile was 13.85 per cent, and the decrease in passenger revenue was 14.71 per cent. The freight business measured in tons shows a decrease of 142,000 tons, or .59 per cent, but measured in ton miles it shows a decrease of 4.46 per cent, due to a decrease in shipments of apples and lumber from the Pacific Coast. The revenue per ton mile compared with the average of the three years ended June 30, 1917, increased 42 per cent, while wages increased 120 per cent, the cost of fuel 60 per cent, and the cost of other material 74 per cent.

The operating revenues of the Company decreased \$6,709,656.11, or 6.58 per cent compared with 1923, while operating expenses decreased \$9,831,745.73, or 12.23 per cent. The net revenue increased \$3,122,089.62, or 14.43 per cent. The gain in the net is principally due to the saving in transportation of \$4,345,083.07, a decrease of 11.28 per cent, while train miles decreased only 5.94 per cent.

Return on Property.

Year Ending December 31,	Railway Property Investment Including Material and Supplies and Working Cash at End of Year	Net Railway Operating Income	Return on Investment Per Cent
1916	\$521,303.308	\$33,446,012	6.416
1917	526,294.063	30,491,140	5.794
1918	533,605.992	24,217,342	4.538
1919	534,450.449	14,368,479	2.688
1920	549,775.317	7,949,458	1.446
1921	561,436.950	10,843,826	1.931
1922	560,271,172	19,450,515	3.472
1923	583,882,752	17,100,557	2.929
1924	588,886,578	19,861,077	3.373

In the nine years ended December 31, 1924, there has been added to the property \$79,908,972, so as to enable the Company to give better service and overcome in part the increased costs; while in the same period, not counting the increase in debt due to the refunding of the Northern Pacific Great Northern (C. B. & Q. Collateral) Joint 4s in 1921, the total debt outstanding in the hands of the public decreased \$5,583,900.

It will be noted that there has been an improvement in the rate of return since 1920 when Federal Control ceased, but that the returns are much less than they were prior to the period when the dislocating effect of the war and Federal Control began to be cumulative.

In spite of some improvement the returns are not satisfactory, although your property has been operated honestly, efficiently and economically and is in very much better condition to give service than ever before. The general rate basis, however, is too low compared with the increase in wages, fuel and materials. The competition of the Panama Canal is increasing and that route is taking a larger proportion each year of business formerly handled

by the railroads. The automobile, motor bus and motor truck are taking more business, both freight and passenger, each year.

The western roads have asked the Interstate Commerce Commission for permission to meet in part the competition of the Panama Canal; they have also called to the attention of the Commission the very low rate of return earned and asked for relief, as the rate of return is too low for the general well being of the transportation agencies serving a very large and important part of the United States. Agriculture and general business conditions are improving.

In the petition recently filed with the Interstate Commerce Commission by sixty-six western railroads asking for the issue of the necessary order or orders which will result in yielding to the carriers operating in the western district a net return of not less than 5 1/4 per cent, it is shown that the returns upon the book cost of road and equipment, including materials and supplies and cash, of these roads for the years 1921 to 1924 were as follows:

Excluding Switching and Terminal Companies		Including Switching and Terminal Companies	
Year	Per Cent	Year	Per Cent
1921	3.02	1921	3.12
1922	3.43	1922	3.45
1923	3.91	1923	3.96
1924	3.82	1924	3.87

The average rate of return per annum for the four years was only 3.55 per cent (3.61 per cent including switching and terminal companies).

Claim against the Government.

The claim against the Government covering the guaranty period ended September 1, 1920, has not yet been settled. The basis of settlement proposed by the Director of the Division of Finance of the Interstate Commerce Commission was not acceptable to the Company, and the question has been argued before and submitted to that Division, which now has it under advisement.

Valuation Work.

The conferences with representatives of the Bureau of Valuation of the Interstate Commerce Commission about the preliminary engineering and land reports heretofore served upon the Company, which were begun in 1923, were continued during 1924. It is thought that tentative valuation report will be received the latter part of 1925.

At the end of 1924, forty-four employees were engaged on this work, and the amount expended by the Company to that date in connection with this work was \$2,062,554.88.

Land Department.

Statements summarizing the operations of the Land Department for the year appear on pages 45 and 46.

The agricultural situation in North Dakota and Montana has improved materially during the past year. Generally speaking, the territory served by the Company has enjoyed a season in which good crops and good prices have combined to give the farmer for the first time in several years a better return for his labor. The sheep industry was prosperous during the year, but the cattle industry was and still is depressed. Financial conditions in North Dakota and Montana have greatly improved and debts are being liquidated.

While the market for farm lands is not as good as before the war, there are evidences of reviving interest. There were sold in 1924, 127,175.52 acres compared with 89,197.47 acres in 1923, while the acreage in contracts cancelled in 1924 was 225,305.44, compared with 508,724.73 in 1923. The total net sales in 1924 were \$1,054,039.12 compared with a minus figure of \$944,359.58 in 1923. Net cash receipts in 1924 amounted to \$1,558,771.62 compared with \$858,538.55 in 1923. These comparisons reflect the improvement in the prevailing conditions.

The timber industry in the west has had another fairly good year and a brisk demand for stumpage at good prices continues. The outlook for increased sales of land and timber during 1925 appears to be good.

Oil Development.

Drilling operations conducted during the year by the Absaroka Oil Development Company, or its permittees, in various localities have so far failed to produce oil, but the work is being continued at a number of places.

Taxes.

The following statement shows taxes accrued each year during the past four years:

	1921	1922	1923	1924
State taxes	\$8,339,049.60	\$8,257,045.00	\$7,748,214.88	\$7,613,707.86
Federal taxes	638,983.26	142,538.11	662,883.31	892,660.95
Canadian and miscellaneous taxes	36,087.64	31,000.00	51,792.37	40,388.90
Totals	\$9,014,120.50	\$8,430,583.11	\$8,462,890.56	\$8,546,757.71

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Comparative Statement of Payrolls.

A comparison of payrolls for a period of years ending December 31, follows:

1916	\$28,204,669.00
1917	35,877,879.00
1918	49,632,127.00
1919	52,605,396.00
1920	66,503,794.00
1921	50,643,526.00
1922	49,041,401.00
1923	51,921,572.00
1924	45,950,886.00

Security Owners and Employees.

There are now about 38,000 owners of stock and 30,000 owners of bonds of the Company.

As showing the number of small stockholders, the following figures are interesting:

20,655 held from 1 to 19 shares.
12,522 held from 20 to 99 shares.

33,177 or 86.73 per cent hold less than 100 shares each.
5,076 held 100 or more shares.

Total 38,253

14,082 of the stockholders are women.

2,467 are savings banks, insurance companies, trustees, guardians, colleges and charitable institutions.

The average number of employees in 1924 was 27,133.

Subsidiary Companies.

The operating results of the Spokane, Portland and Seattle Railway Company, together with its subsidiaries, the Oregon Trunk, Oregon Electric and United Railways, will be found on page 47, and those of the Minnesota and International Railway Company on page 48.

Effective January 1, 1924, the United Railways Company included in its operation the line of the Portland, Astoria and Pacific Railway Company.

Improvement in Freight Car Equipment.

On December 31, 1920, the Company had 48,729 freight cars with a total capacity of 1,872,735 tons, and an average capacity of 38.43 tons. Since that date many old weak cars of small capacity have been dismantled; many others have been rebuilt and new cars purchased, so that on December 31, 1924, the Company had 47,700 freight cars with a total capacity of 1,899,725 tons, and an average capacity of 39.83 tons.

Improvement in freight car condition is indicated by the following tabulation:

	March 1, 1920	Dec. 31, 1924
Cars new or rebuilt within 5 years.....	5,272	25,410
Cars with steel center sills.....	18,860	22,639
Cars with steel underframes.....	3,773	10,238
Cars—all steel construction.....	3,795	4,694
Cars with metal roofs.....	19,094	27,999
Cars with steel ends.....	.....	4,000

General Balance Sheet, December 31, 1924

ASSETS			LIABILITIES		
	1924	1923		1924	1923
INVESTMENTS.			STOCK.		
ROAD AND EQUIPMENT.			Capital stock—common.....	\$248,000,000.00	\$248,000,000.00
Road	\$452,620,493.28	\$449,127,706.43	GOVERNMENTAL GRANTS.		
Equipment	110,652,496.05	165,637,516.89	Grants in aid of construction	526,233.97	80,714.05
General	3,491,796.90	3,372,228.80	LONG-TERM DEBT.		
	566,764,786.23	558,137,452.12	Funded debt (see page 22) ..	335,815,500.00	329,176,500.00
DEPOSITS IN LIEU OF MORTGAGED PROPERTY			Less—held by or for the Company	17,166,500.00	9,327,000.00
(Not moneys in hands of Trustees from sale of land grant land, etc.).....	1,491,096.83	440,542.66		318,649,000.00	319,849,500.00
MISCELLANEOUS PHYSICAL PROPERTY				567,175,233.97	567,930,214.05
	9,948,439.43	8,661,252.95	Total Capital Liabilities.	567,175,233.97	567,930,214.05
INVESTMENTS IN AFFILIATED COMPANIES.			CURRENT LIABILITIES.		
Stocks	144,085,286.01	144,075,276.01	Traffic and car service balances payable	921,570.01	1,402,362.58
Bonds	30,202,647.75	30,203,797.75	Audited vouchers and wages payable	6,593,157.21	8,019,262.51
Notes	2,379,399.35	2,392,899.35	Miscellaneous accounts payable	793,554.28	488,189.04
Advances	3,146,344.35	2,983,110.22	Interest matured unpaid....	5,381,315.00	5,439,933.75
	179,813,677.46	179,655,083.33	Unmatured dividends declared	3,100,000.00	3,100,000.00
OTHER INVESTMENTS.			Unmatured interest accrued.	385,169.16	396,702.08
Stocks	1.00	1.00	Unmatured rents accrued....	7,278.45	7,159.70
Bonds	1,784,875.07	2,489,525.07	Other current liabilities.....	145,766.95	172,305.36
U. S. Treasury notes....	1,269,531.25	1,051,489.58		17,327,751.09	19,026,215.02
Contracts for sale of land grant lands	5,727,197.58	7,435,092.34	Total Current Liabilities.	17,327,751.09	19,026,215.02
	8,781,604.90	10,976,107.99	DEFERRED LIABILITIES.		
Total Capital Assets.....	766,799,604.85	757,870,439.05	Due U. S. Government account various transactions.	.....	55,471.04
CURRENT ASSETS.			Other deferred liabilities....	184,105.80	267,607.65
Cash	9,229,906.54	10,374,362.29		184,105.80	323,078.69
Time drafts and deposits..	.....	1,378.00	UNADJUSTED CREDITS.		
Special deposits	5,321,833.62	5,532,505.55	Tax liability	7,523,876.19	7,270,563.60
Loans and bills receivable.	8,346.86	855.30	Operating reserves	171,627.16	355,097.65
Traffic and car service balances receivable	1,783,589.61	1,874,994.93	Accrued depreciation of equipment	38,393,563.62	36,773,132.81
Net balances receivable from agents and conductors....	803,655.05	996,664.35	Other unadjusted credits....	1,131,649.79	1,590,903.32
Miscellaneous accounts receivable	3,484,195.30	4,594,509.12		47,220,716.76	45,989,697.38
Material and supplies.....	12,196,205.87	14,709,233.81	CORPORATE SURPLUS.		
Interest, dividends and rents receivable	109,908.01	82,907.86	Additions to property through income and surplus.....	441,840.40	379,612.49
Other current assets.....	112,165.55	119,867.71	Funded debt retired through income and surplus.....	16,333,382.79	16,092,739.04
	33,049,806.41	38,287,278.92	Miscellaneous fund reserves.	1,337,860.85	294,382.39
DEFERRED ASSETS.				18,113,084.04	16,766,733.92
Working fund advances....	32,563.33	34,977.54	Profit and loss balance....	158,692,074.84	156,541,308.62
Due from U. S. Government account various transactions	43,013.86	1,891.91		176,805,158.88	173,308,042.54
Other deferred assets.....	16,086.91	14,467.86	Total Corporate Surplus.	176,805,158.88	173,308,042.54
	91,664.10	51,337.31			
UNADJUSTED DEBITS.					
Rents and insurance premiums paid in advance....	29,899.99	32,499.99			
Balance of Guaranty due from Government	2,775,317.59	2,936,117.59			
Discount on funded debt....	2,376,903.84	2,394,492.29			
Other unadjusted debits....	3,589,769.72	5,005,082.53			
	8,771,891.14	10,368,192.40			
	\$808,712,966.50	\$806,577,247.68			

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With the exception of 1923, freight cars and locomotives are in better condition than at any time since 1917. Seven hundred forty-four locomotives are now equipped with superheaters, and 178 with mechanical stokers. The total tractive power of locomotives is 53,972,450 pounds, an average of 38,089 pounds, as against total tractive power of 46,467,200 pounds, and an average of 34,142 pounds on December 31, 1917.

Erroneous Inclusion of Northern Pacific Lands Within the Boundaries of National Forests.

In the report for the year 1923 the following statement was made:

"In consequence of the failure of the Government to survey the lands granted to the Northern Pacific in 1864 many of them were lost to settlers; and it was ascertained more than twenty-five years ago that the available lands within the 'indemnity' limits of the grant were not sufficient to make up for these losses. Notwithstanding this fact the Government proceeded, against our protest, to include within the boundaries of National Forests a large quantity of Northern Pacific indemnity lands. The question of the right of the Government to do this having been submitted to the Courts, it was decided in favor of your Company by the Supreme Court of the United States on April 11, 1921.

"The right of your Company to the lands in dispute would therefore seem to have been established; but at the instance of the Secretary of Agriculture, the President has asked Congress to again review the whole question of the administration of the grant for the purpose of ascertaining whether, in the adjustment of the numerous questions that have arisen during the past fifty years, some basis can be found for the retention of these lands by the Government. It is confidently believed that your Company's right to them cannot be successfully challenged."

The Joint Congressional Committee, to which this subject was referred by the last Congress, is now in session in Washington, and witnesses are being heard and testimony submitted in behalf of both this Company and the Government.

Financial Condition.

The exceptionally strong financial condition of the Company, to which attention was directed in last year's report, has been improved. During the past year the net additions and betterments made to the property amounted to \$8,627,334.11, against which no securities have been issued, while the outstanding funded debt has been reduced from \$319,849,500 to \$318,649,000, or a net reduction of \$1,200,500. Including the amounts expended for additions and betterments during 1924 the Company now has an established credit

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basis for the issue of bonds under the provisions of its Refunding and Improvement Mortgage of approximately \$79,000,000; represented by additions and betterments not capitalized; prior debt retired (which is refundable under the mortgage but against which no bonds have been issued); and on account of Burlington stock, against which only a part of the bonds issuable therefor have been issued.

Personnel.

On January 20, 1925, the Company lost through death its Vice-President in Charge of Maintenance and Operation, Mr. John M. Rapelje, who entered the service of the Company in 1888 and served it continuously until his death. Mr. Rapelje was succeeded by Mr. A. M. Burt, Assistant Vice-President, who had also served the Company for many years, having originally entered its employ in 1889. On April 20, 1925, Mr. Burt also died, after a very brief illness. It is with the deepest regret that the death of these two able and faithful officers is recorded.

Pension Department.

The Company's pension plan has now been in operation since May 1, 1922. On December 31, 1924, there were on the retired list 389 employees, whose average monthly allowance was \$45.47. During the year 95 employees were added to the list and 32 died. The total amount disbursed during the year was \$205,204.04.

Group Insurance.

On October 1, 1924, the Company put into effect a group insurance plan which provides that employees who have been in the service six months but who have not completed a year's service shall receive \$250 free insurance. At the expiration of one year's service, this amount is increased to \$500. In addition to the free insurance, each employee who has completed one year's service may purchase additional insurance at a low rate, the amount of such additional insurance depending on the rate of monthly pay, the maximum being \$3,000. The actual cost of this additional insurance over and above the rate paid by the employee is borne by the Company. The adoption of the plan was contingent upon 75 per cent of the employees in service for more than one year having subscribed for the additional insurance over and above the free allowance of \$500. Such additional insurance was taken out by 98 per cent of the employees.

By order of the Board of Directors,

HOWARD ELLIOTT, Chairman,
CHARLES DONNELLY, President.

Railway Financial News

(Continued from Page 58)

within the exclusive jurisdiction of the Interstate Commerce Commission.

KANSAS CITY SOUTHERN.—Indicted for Failure to Report Note.—The District of Columbia federal grand jury has returned an indictment charging violation of paragraph nine of section 20-a of the interstate commerce act in failure to file a certificate of notification with the Interstate Commerce Commission within ten days of a six months note given to the Bankers' Trust Company of New York last November to secure a loan of \$1,000,000. The certificate is said to have been filed on March 17, 1925.

KANSAS CITY TERMINAL.—Bonds.—This company has applied to the Interstate Commerce Commission for authority to sell \$18,908,000 of first mortgage 4 per cent gold bonds now pledged as collateral for short term notes.

NEW ORLEANS, TEXAS & MEXICO.—Bond Exchange Extended. Holders of the income bonds of the New Orleans, Texas & Mexico have received notice from William H. Williams, chairman of the board, calling attention to the offer of the railroad to issue in exchange for the 5 per cent income bonds a like principal amount of its first mortgage 5 per cent gold bonds, series B, maturing April 1, 1954. Mr. Williams announced that holders of \$7,883,400 of the income bonds out of the original \$13,500,000 have already accepted the offer.

The notice further stated that to enable holders of the remaining bonds to take advantage of the offer the company has obtained from the Interstate Commerce Commission authority to extend it to June 30, 1926, and the executive committee of the board of directors has authorized the extension. Holders of the income bonds desiring to accept the offer are requested to deposit their

bonds with the Irving Bank-Columbia Trust Company, New York City.

NEW YORK, CHICAGO & ST. LOUIS.—Unification Hearing Adjourned.—The hearing before Commissioner Meyer of the Interstate Commerce Commission on the application for authority for the unification plan was adjourned on June 25 until some date to be determined later, after July 15, to await a decision by the commission on the question argued before it on June 24 as to how far counsel for the dissenting Chesapeake & Ohio stockholders may inquire on cross-examination into the personal affairs of the Van Sweringen brothers. Before the adjournment Prof. William J. Cunningham of Harvard testified that he regarded the unification plan as in the public interest and calculated to establish a sound transportation agency. He thought the success of the plan would encourage further unification while its failure would have a discouraging effect and that it would not only preserve competition but considerably extend it and afford better service. He expressed his belief in the inherent soundness of consolidation as a principle.

RIO GRANDE & EAGLE PASS.—Line Abandonment.—The Interstate Commerce Commission has authorized this company to abandon its Minera, Tex., station and 8,000 ft. of track adjacent thereto.

SOUTHERN PACIFIC.—Stock Transfers.—Transfers of Southern Pacific stock, which have formerly been made only in New York, can now be made at the general offices of the company at San Francisco, Cal.

SOUTHERN PACIFIC.—Acquisition.—This company has applied to the Interstate Commerce Commission for authority to acquire control by stock ownership of the Nevada-California-Oregon, extending from Wendel, Calif., to Lakeview, Ore., 154.6 miles.

SOUTHERN PACIFIC.—Equipment Trust.—The Interstate Commerce Commission has granted authority for the issuance of

\$10,491,000 equipment trust certificates, series H, to be sold to Kuhn, Loeb & Co. at 96.91 per cent of par and accrued dividends which will make the cost to the railroad approximately 4.95 per cent. The equipment includes 43 locomotives, 4,666 freight cars, 18 passenger cars and other miscellaneous equipment, having a total approximate cost of \$15,000,000. Commissioner Eastman dissented for the same reasons as were expressed in the docket relating to the New York Central Lines' equipment trust, reported in the *Railway Age* of May 23.

SOUTHERN RAILWAY.—Preferred Stockholders Lose Case.—Judge Beverley T. Crump in the Law and Equity Court of Richmond, Va., gave his decision on June 28, denying the contention of the Norwich Water Power Company and other preferred stockholders that they are entitled to back dividends totaling \$29,000,000. In his decision, Judge Crump said:

"The contract here does not give the preferred stockholders a fixed dividend chargeable upon the profits of each and every year, irrespective of a declaration of dividends by the board, and hence does not create in favor of the preferred stockholder an obligation upon the company which places the company under a continuing liability to him for a percentage of the earnings made, and not paid in any one year. This is the effect here of the phrase non-cumulative as determined by the other provisions accompanying its use and by the language serving to show what it should be taken to mean.

"Without undertaking to cover the many interesting subsidiary questions presented and argued by counsel, I am of opinion, upon the whole case, that when the directors of the Southern Railway Company failed to declare dividends for the benefit of the preferred stockholders in any year in which the earnings were sufficient for that purpose and in the bona fide exercise of their discretion allowed those earnings not declared as dividends to be used for general corporate purposes as they deemed best, such failure to declare a dividend settled the question as to the right of any class of stockholders to demand payment out of the then existing or future earnings of the railroad company, of any such past dividend.

"In the particular case presented here, it must be taken as a fact that the directors acting wisely and not arbitrarily found it necessary in the year in which no dividends upon the preferred stock were declared or in which the dividends declared were less than 5 per cent to use the earnings of the road for operating necessities, betterment and improvement which in their judgment they thought essential.

"I do not think the fact that the net earnings of the road were carried on the books of the company and received accretions from year to year as earnings were made until the book account carried under the head of profit and loss aggregated the large total of \$142,500,000, less the amount paid to stockholders as dividends as before stated, whether that account be designated working reserve, or surplus, or profit and loss, changes its character. However, the account may be designated, it is manifestly a book account under which the gradually accruing surplus net earnings of the company are carried. The fact remains, however, that while the account was carried in order to have a proper system of bookkeeping and auditing, these earnings so made and existing upon the books beyond the capital of the corporation had been used for betterments, improvements and otherwise for general corporate purpose and existed only as a book account.

"For the reason herein stated, the conclusion reached by me is that the injunction should be denied and a final decree entered in favor of the defendant."

Amendment was made that the case would be appealed to a higher court.

TOLEDO, ANGOLA & WESTERN.—Securities.—This company has applied to the Interstate Commerce Commission for authority to issue 3,000 shares of no par value common stock and \$350,000 of first mortgage 6 per cent bonds.

VIRGINIAN.—Bonds.—This company has applied to the Interstate Commerce Commission for authority to nominally issue \$3,109,000 of first mortgage 5 per cent 50-year gold bonds.

Dividends Declared

Allegheny & Western.—3 per cent, payable July 1 to holders of record June 25.

Atchison, Topeka & Santa Fe.—Common, \$1.25, quarterly, payable September 1 to holders of record July 24.

Carolina, Clinchfield & Ohio.—(Stamped stock) \$1.25, payable July 10 to holders of record June 30.

Central Railroad of N. J.—2 per cent, quarterly, payable August 15 to holders of record August 5. Extra, 2 per cent, payable July 15 to holders of record July 7.

Delaware, Lackawanna & Western.—\$1.50, quarterly, payable July 20 to holders of record July 6.

Elmira & Williamsport.—Preferred, \$1.61, payable July 1 to holders of record June 20.

Illinois Central.—Common, \$1.75, quarterly; Preferred, \$3.00, semi-annually, both payable September 1 to holders of record August 5.

Lehigh Valley (ctfs. of int.).—\$1.25, payable August 1 to holders of record July 11.

Rome & Clinton.—2½ per cent, payable July 1 to holders of record June 23.

Trend of Railway Stock and Bond Prices

	June 30	Last Week	Last Year
Average price of 20 representative railway stocks	80.73	79.63	67.25
Average price of 20 representative railway bonds	90.93	91.31	87.37

Railway Officers

Executive

R. N. Van Doren, general solicitor of the Chicago & North Western, with headquarters at Chicago, has been promoted to vice-president and general counsel, with the same headquarters, succeeding F. W. Sargent.

Mr. Van Doren was born on January 11, 1878, in Oshkosh, Wis., and was graduated from the University of Wisconsin in 1898. He became engaged in the general practice of law and entered railway service on January 1, 1917, as Wisconsin attorney for the Chicago & North Western. In May, 1918, he was transferred to Omaha, Nebr., as Nebraska attorney and continued in this position until July of the same year when he was promoted to general attorney of the Chicago, St. Paul, Minneapolis & Omaha, with headquarters at St. Paul, Minn. In addition he also served as Minnesota attorney for the Chicago & North Western. He was transferred to Milwaukee, Wis., as Wisconsin attorney in January, 1919, and held this position until July 1, 1921, when he was promoted to assistant general solicitor, with headquarters at Chicago. In January, 1924, he was promoted to general solicitor, which position he held at the time of his recent promotion.



R. N. Van Doren

E. L. Taylor, who has been appointed assistant to vice-president in charge of industrial development of the New York, New Haven & Hartford, was born on September 8, 1879, at Albany, N. Y., and received his elementary education at Albany Academy. He was graduated from Sheffield Scientific School, Yale University, with the degree of Ph.B., in 1901 and was an instructor in this institution from the time of his graduation until 1903, when he went to the University of Kansas as assistant professor of civil engineering. In 1904 he received the degree of C.E. from Yale University, and from that year until 1906 was instructor in civil engineering at Sheffield. In 1906 he served for a short time in the engineering department of the New York, New Haven & Hartford, and then entered the service of the New York Central, maintenance-of-way department, at Albany, N. Y. In 1908 he was promoted to assistant engineer at New York. In 1911 he entered the office of the designing engineer in charge of the company's West Side (New York City) improvements. In 1912 he became an assistant engineer in the office of the engineer, maintenance-of-way, of the New



E. L. Taylor

York, New Haven & Hartford. In the following year he was transferred in the same capacity to the staff of the general manager. In 1914 he was appointed contract agent of the New Haven and the Central New England, and remained in that capacity until the time of his recent promotion. Mr. Taylor served in the war as a first lieutenant of engineers, and at the present time is a major of engineers in the officers' reserve corps.

W. H. Dalton, assistant to the chairman of the Chicago & North Western, with headquarters at Chicago, has been appointed assistant to the president, with the same headquarters.

Financial, Legal and Accounting

S. H. Cady, assistant general solicitor of the Chicago & North Western, with headquarters at Chicago, has been promoted to general solicitor succeeding Mr. Van Doren. **N. F. Morehouse**, general attorney, with headquarters at Chicago, has been promoted to assistant general solicitor, with the same headquarters, succeeding Mr. Cady.

Operating

J. D. Fitzgerald, assistant to the general superintendent of transportation of the Southwestern region of the Pennsylvania, with headquarters at St. Louis, Mo., has been transferred to the Western region, a consolidation of the former Northwestern and Southwestern regions, with headquarters at Chicago.

H. W. Hale, assistant superintendent of the Cherokee sub-division of the St. Louis-San Francisco, with headquarters at Sapulpa, Okla., has been transferred to the Creek and Sherman sub-divisions, with headquarters at Francis, Okla., succeeding **E. L. Hill**, who replaces Mr. Hale on the Cherokee sub-division. **W. R. Brown**, assistant superintendent of the Oklahoma sub-division, with headquarters at Oklahoma City, Okla., has been transferred to the Chickasha sub-division, with the same headquarters, succeeding **F. E. Brannaman**, who replaces Mr. Brown on the Oklahoma sub-division.

Philip T. White has been appointed general superintendent of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Indianapolis, succeeding **B. C. Byers**, transferred. **F. N. Reynolds** has been appointed assistant general superintendent, with headquarters at Indianapolis, succeeding Mr. White. **H. F. Milligan** has been appointed superintendent, St. Louis division, with headquarters at Mattoon, Ill., vice Mr. Reynolds. **E. M. Kelley** has been appointed superintendent of the Cairo division, with headquarters at Mt. Carmel, Ill., succeeding Mr. Milligan, and **B. C. Byers** has been appointed superintendent of Indianapolis Terminals and Springfield division, with headquarters at Indianapolis, Ind., succeeding Mr. Kelley.

William J. Warnick, who has been appointed superintendent of the Toronto, Hamilton & Buffalo, with headquarters at Hamilton, Ont., was born on March 20, 1880, at Hamilton, Ont. He was educated in the public schools and in business college, and entered railway service on January 9, 1896, as a clerk in the general office of the Toronto, Hamilton & Buffalo. In March, 1897, he became operator and freight clerk and held this position until July, 1902, when he became dispatcher. From July, 1910 to 1912, he was assistant chief dispatcher, and from 1912 to 1915, he was chief dispatcher. He was trainmaster from January, 1915, to January, 1925, when he was appointed acting superintendent, which position he held at the time of his recent appointment to superintendent.

F. L. Burckhalter, who has been promoted to first assistant general manager of the Southern Pacific, with headquarters at San Francisco, Cal., was born at Truckee, Cal., in 1879, and was graduated from the University of California in 1900. He entered railway service in August of that year as a rodman on the Southern Pacific, later being assigned to work as levelman and computer in a location survey party. He was promoted to assistant engineer in February, 1902, and was later promoted to roadmaster in the maintenance of way department. In March, 1906, Mr. Burckhalter was promoted to

division engineer at Bakersfield, Cal., where he remained until November, 1908, when he was transferred to Los Angeles. He was promoted to district engineer at Portland, Ore., in November, 1911, and held that position until March, 1914, when he was promoted to superintendent of the Portland division. In September, 1918, Mr. Burckhalter was promoted to assistant general manager in charge of the Northern district, with headquarters at San Francisco, Cal. He held that position until his recent promotion to first assistant general manager, with jurisdiction over the entire system.

Traffic

J. H. Cummings, district passenger agent of the Chicago Great Western, with headquarters at Chicago, has been promoted to general agent, with headquarters at Dallas, Tex.

W. H. Turner has been appointed general agent of the Texas & Pacific, with headquarters at Denver, Colo., in charge of a newly established freight and passenger agency.

A. R. Gould, assistant passenger traffic manager of the Chicago & North Western, with headquarters at Chicago, has been appointed assistant freight and passenger traffic manager in charge of off-line agencies, with the same headquarters, a newly created position.

J. D. Noriega has been appointed traffic manager of the National Railways of Mexico, with headquarters at Mexico City, Mex., a newly created position. **L. Valdes**, general freight agent, with headquarters at Mexico City, has been promoted to chief assistant freight traffic manager, with the same headquarters. **R. M. Campos** and **S. J. Llanos**, assistant general freight agents, have been promoted to assistants to the freight traffic manager, with headquarters at Mexico City.

B. K. Smith, general passenger agent of the Western Pacific, with headquarters at San Francisco, Cal., has been promoted to assistant traffic manager, with the same headquarters, a

newly created position. **J. L. Scott**, general agent, passenger department, at San Francisco, has been promoted to general passenger agent, succeeding Mr. Smith. Mr. Smith was born on August 2, 1883, at San Francisco, and entered railway service in 1899 in the traffic department of the Denver & Rio Grande. He was later promoted to city passenger agent and traveling agent, and still later was appointed city passenger agent of the Missouri Pacific. He was promoted to division passenger agent in

September, 1913, and held that position until August, 1916, when he entered the service of the Western Pacific as general passenger agent. Mr. Smith continued in that capacity until his recent promotion to assistant traffic manager. Mr. Scott entered railway service in the traffic department of the Pennsylvania at New York. He was employed in the traffic department of the Western Pacific in 1910 and in the following 10 years served in various positions, including that of trainmaster. He was promoted to general agent, passenger department, at Salt Lake City, Utah, in 1920, and later in the same year was transferred to San Francisco, where he remained until his recent promotion to general passenger agent.

E. W. Soergel, who has been promoted to general freight agent of the Chicago, Milwaukee & St. Paul, with headquarters at Chicago, was born on July 15, 1886, at Chicago, and entered railway service in 1901 in the traffic department of the Chicago, Milwaukee & St. Paul. He was promoted to chief clerk at



B. K. Smith

Butte, Mont., in 1908, and the following year was transferred to Seattle, Wash. Mr. Soergel remained there until 1919 when he was appointed examiner of the Western Freight Traffic Committee. In 1920 he returned to the St. Paul as assistant general freight agent and was later promoted to assistant to the freight traffic manager. He held that position until his recent promotion to general freight agent.

E. B. Finegan, who has been promoted to assistant freight traffic manager of the Chicago, Milwaukee & St. Paul, with headquarters at Chicago, was born on November 16, 1880, at Iron Ridge, Wis. He entered railway service in September, 1899, in the shops of the Chicago, St. Paul, Minneapolis & Omaha, where he remained until 1903, when he was employed in the office of the general agent of the Great Northern at St. Paul, Minn. Mr. Finegan entered the service of the Chicago, Milwaukee & St. Paul in May, 1904, as stenographer and clerk in the traffic department. He was promoted to chief clerk to the assistant general freight agent in November, 1906, and he later successively served in the same capacity for the general freight agent, the freight traffic manager and the vice-president in charge of traffic. Mr. Finegan was promoted to chief of the Tariff Bureau in April, 1916, and in February, 1917, was promoted to assistant general freight agent. He was promoted to general freight agent in April, 1922, and held that position until his recent promotion to assistant freight traffic manager.

James E. Weller, who has been promoted to assistant traffic manager of the Pennsylvania, with headquarters at Chicago, was born on September 30, 1868, at North Liberty, Pa. He entered railway service in September, 1887, in the traffic department of the Lake Shore & Michigan Southern, now a part of the New York Central, and in July, 1890, was employed in the same department of the Pittsburgh, Cincinnati, Chicago & St. Louis now a part of the Pennsylvania. Mr. Weller was promoted to traveling freight agent in November, 1891, and held that position until January, 1897, when he was promoted to commercial agent. He was promoted to district freight solicitor in March, 1906, and two years later was promoted to division freight agent. He was promoted to general western freight agent in June, 1910, and held that position until August, 1918, when he was appointed assistant chief of the Inland Traffic Service of the United States War Department at Pittsburgh, Pa. Mr. Weller was appointed regional traffic assistant in January, 1919, where he remained until the termination of federal control in March, 1920, when he was appointed freight traffic manager of the Northwestern region of the Pennsylvania, with headquarters at Chicago. Mr. Weller continued in that capacity until his recent promotion to assistant traffic manager of the system.

Mechanical

E. B. Dailey, assistant to the director of purchases of the Southern Pacific, with headquarters at San Francisco, Cal., has been promoted to engineer car construction, with the same headquarters, a newly created position. **George B. Hart** has been appointed assistant to the general superintendent of motive power, with headquarters at San Francisco, this also being a new position.

W. B. Embury, master mechanic of the Kansas City Terminal-St. Louis division of the Chicago, Rock Island & Pacific, with headquarters at Armourdale, Kans., has been promoted to superintendent motive power of the Second district, with headquarters at El Reno, Okla., succeeding P. J. Colligan, promoted. **A. R. Ruiter**, master mechanic, with headquarters at Chickasha, Okla., has been transferred to the Kansas City Terminal-St. Louis division, succeeding Mr. Embury. **J. C. Cole**, master mechanic of the El Paso-Amarillo division, with headquarters at Dalhart, Texas, has been transferred to Chickasha, succeeding Mr. Ruiter. **A. Hambleton** has been appointed master mechanic of the El Paso-Amarillo division, succeeding Mr. Cole.

Frank H. Becherer, who has been appointed assistant to the mechanical superintendent of the Boston & Maine, with headquarters at Boston, was born on August 23, 1882, in New York City. He graduated from high school in Indiana in 1901, and

attended a Y. M. C. A. night school in Buffalo until 1906. He entered railway service in 1901, as a billing clerk on the Erie, and held this position until 1903, when he became assistant chief clerk of the car department. In 1904, he was promoted to piece work supervisor of the car department and, in 1905, to chief clerk of the department. On June 1, 1907, he resigned and went with the Pennsylvania as assistant chief M. C. B. billing clerk, and was successively to 1918, freight car repairer, freight car inspector, air brake inspector, piece work inspector of freight, traveling inspector for the superintendent of motive power, assistant foreman car inspector (freight), assistant foreman passenger cars, foreman passenger cars and foreman enginehouse, powerhouse and machine shop. On March 25, 1918, he resigned to enter the service of the Interstate Commerce Commission, Bureau of Valuation, as a junior inspector of car equipment. On October 1, 1919, he became senior mechanical engineer engaged in valuing freight, passenger, work, powerhouse and machine shop equipment and locomotives. On March 1, 1922, he resigned and entered the service of the Boston & Maine as assistant engineer, corporate engineer's office. On October 1, 1922, he became mechanical inspector, and in April, 1923, general inspector car maintenance, which position he held until June 16, 1925, when he was appointed assistant to the mechanical superintendent.

Purchasing and Stores

W. F. Naumann has been appointed division storekeeper on the Illinois Central, with headquarters at East St. Louis, Ill., succeeding **W. A. Skinner**, who has retired on pension.

A. G. Follette, supervisor of the stores catalog of the Pennsylvania, has been appointed assistant chief general material supervisor. **W. R. Knauer** has succeeded Mr. Follette as supervisor of the stores catalog.

Obituary

Frederick F. Backus, executive assistant of the Toronto, Hamilton & Buffalo, died at his home in Hamilton, Ont., on June 24. A sketch of Mr. Backus' railroad career appeared in the *Railway Age* of June 20.

William B. Howard, general executive assistant of the Canadian Pacific, died at his home in Montreal on June 28. Mr. Howard was born at Chatham, N. B., on September 15, 1877. He attended Chatham Grammar School and entered the employ of the Canadian Pacific on August 22, 1897, as a junior clerk. After two years in the district passenger department at St. John he was, in August, 1899, promoted to the post of traveling passenger agent, St. John district. In February, 1902, he became chief clerk of the department in which he started, and in June, 1906, he was named acting district passenger agent. Six months later he was nominated permanently to that office, and he remained in that position until February, 1916, when he was transferred to Toronto as district passenger agent. In September, 1922, Mr. Howard went to Montreal as assistant general passenger agent, eastern lines. Last January he was promoted to the post of general executive assistant and held that office until his death.

THE RECEIPTS of the Italian Railways for year ended June 30, 1924, exceeded expenses by over 100,000,000 lire, according to estimates. This compares with an excess of expenses over receipts amounting to 1,257,946,309 lire in 1921-22, 906,401,513 lire in 1922-23 and 298,143,245 lire in 1923-24. (The average rate of the lira for 1924 was 4.358 cents).

RECENT purchases by the South African Railways total £1,166,962 of which £817,230 was for British and £349,732 for German equipment. The equipment ordered consisted of 39 locomotives, 75 first and second class main line passenger cars, 89 first class and 21 second class suburban passenger cars, 8 other passenger cars, and 369 freight cars. American manufacturers have not been important factors in supplying rolling stock, but American locomotives have been used extensively.